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FLORA OF PERU

BY

J. FRANCIS MACBRIDE

CURATOR, PERUVIAN BOTANY

BOTANICAL SERIES
FIELD MUSEUM OF NATURAL HISTORY
VOLUME XIII, PART IIIA, NUMBER 2
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J. Francis Macbride

SAPINDACEAE. Soapberry Family

Reference: L. Radlkofer, Sapindaceae, Pflanzenreich IV. 165. 1931–34.

Plants usually ligneous, sometimes trees, often lianas, less frequently herbaceous vines, ordinarily with tendrils and alternate commonly compound leaves, those of the climbing genera often stipulate. Flowers pseudo-polygamous or unisexual, regular or irregular, bracteate and bracteolate in cincinni disposed in racemiform or paniculate inflorescences, generally small with 4–5 (rarely none) often more or less connate usually imbricate sepals and 3–5 (or none) imbricate petals that not rarely are squamate or barbate within. Disk annular, regular or unilateral between the petals and the stems, sometimes obscure. Stamens 8 (5–10 or more), the filaments filiform, the 2-celled anthers usually introrse. Ovary ordinarily 3-celled and 3-lobed, sometimes 2-celled, with simple or divided styles and 1–2 or rarely more anatropous ovules in each cell affixed to the axis. Fruits capsular or drupaceous, variously dehiscent or indehiscent, often consisting of 2–3 samaras. Seeds without endosperm sometimes with a fleshy aril.—In the following compilation the more generic term panicle has been used to include reference to the frequently thyrsoid inflorescence in order to avoid the awkward English plural of thyrsus. As defined by the monographer the species of some genera are highly critical; some, distinguished primarily by presence or absence of papillosity or hypoderma, are especially open to question as suggested by Radlkofer himself who now and then qualifies the characters, if not in his key, often in his descriptions; equally tenuous are a number of other distinctions, particularly those pertaining to the leaves which presumably mark specific lines but more likely point up the variations or instability or both of a few entities that maintain fairly constant populations but produce plenty of aberrations. It is my feeling too that the high proportion of incompletely known species explains in part the difficult (from a practical standpoint) taxonomy, devised largely by the monographer and notable as basically sound, clearly organized and meticulously presented.

The Litchi Tree (*Litchi chinensis* Sonnerat) indigenous to China and one of the most ancient of cultivated plants is also one of the best known members of this world-wide family because of its nut-like subglobose bright red clustered fruits, their papery warty shells drying brown and enclosing a pulp-surrounded seed. Perhaps also in cultivation is the Rambutan (*Nephelium lappaceum L.*), similar but the brittle shell of the fruit covered with long soft processes. The allied but native South American Mamoncillo or Genip (*Melicocca bijuga L.*) has granulate-shelled plum-shaped fruits, the single seed (edible when roasted) enclosed in a sweetish gelatinous pulp. All these trees are in general related to the Peruvian Talisias and illustrated, Chicago Nat. Hist. Mus. Pop. Ser. 26, and elsewhere.

Probably also in cultivation but primarily only for ornament is the African Akee (*Blighia sapida* Koenig), a great tree with beautiful pinnate foliage and large almost bizarre fruits ripening red and yellow and opening into three parts each filled with lustrous white or yellowish tissue (cooked when ripe but dangerous unless taken at exactly the right stage) surrounding the large black poisonous seed.

Scandent plants, often with tendrils.

Calyx with 4–5 imbricate sepals, the two upper connate or the outer smaller; leaflets rarely only 3.

Fruit a samara, usually 3 together; stems often rigid-ligneous even above.....1. *Serjania.*

Fruit often alate dorsally, never samaroid.

Fruit firm, capsular; stems ligneous even above..2. *Paullinia.*

Fruit membranous; stems rather herbaceous above.

Fruits little inflated, alate; leaflets 3.....3. *Urvillea.*

Fruits inflated, not alate; leaflets several.
4. *Cardiospermum.*

Calyx 5-parted or -lobed, the equal segments valvate or subimbricate; leaflets always 3.

Calyx cupulate, the lobes subimbricate; flowers pseudo-umbellate.....5. *Thinouia.*

Calyx lobes valvate; flowers pseudo-racemose...6. *Allosanthus.*

Erect shrubs or trees.

Leaves compound (sometimes by reduction 1-foliolate).

Leaves 3-foliolate or the lateral leaflets rarely wanting.
7. *Allophylus.*

Leaves pinnate (or leaflets only 3 but pinnately disposed in one *Talisia*) or bipinnate.

Leaves bipinnate.....12. *Dilodendron.*

Leaves pinnate.

Fruits rather samaroid, the cells inflated (Peru); sepals rounded, tomentose; leaflets entire.

10. *Porocystis.* 9. *Toulicia.*

Fruits not samaroid; petals normally 5 (rarely 4 or more than 5).

Calyx divisions free, broadly imbricate.

Leaflets entire; fruits indehiscent, usually glabrous or puberulent.

Fruits not granular, usually 3-coccic; sepals petaloid; leaf rachis often winged.....8. *Sapindus.*

Fruits granular, usually 1-celled; sepals subcoriaceous; rachis emarginate.....11. *Talisia.*

Leaflets serrate, unless *C. scrobiculata;* fruits capsular, dehiscent.....13. *Cupania.*

Calyx cupulate, 5-lobed; leaflets entire (Peru); capsules dehiscent.....14. *Matayba.*

Leaves mostly simple; fruit a 3-lobed capsule.....15. *Llagunoa.*

Leaves all simple; fruit a winged capsule.....16. *Dodonaea.*

1. SERJANIA [Plum.] Schum.

Shrubs scandent by axillary or peduncular tendrils, the leaves usually biternate, often pellucid punctate, the stipules minute or none. Flowers irregular, rather small in axillary racemes or panicles with 4–5 persisting sepals, 2 sometimes more or less united, outer 2 smaller, the inner petaloid, and 4 petals, the scales of the lower 2 apically appendaged. Disk glands 4 or the 2 smaller ones sometimes obscure. Style 3-lobed. Fruit 3 samaras, broadly winged toward the base, united along the axis and with indehiscent seed cells at the apex, the seed aril small.—Secondary wood often composite (abnormal) with 3–5 or 8–10 additional wood columns.

The fruit, while partly diagnostic, is incompletely known for many Peruvian species, and much herbarium material is only in flower; the following key therefore has been devised to lead (usually without fruiting character) perhaps at least to some of the more commonly encountered species.

Leaves all simply 5-foliolate, the lower pair of leaflets undivided, or 3-foliolate.

Leaflets 5.

Petioles and rachis wing-margined.....*S. dibotrya.*

Petioles and rachis emarginate.

Leaflets rounded-obtuse or -retuse; inflorescences narrow. *S. elongata.*

Leaflets usually with short obtuse acumen; inflorescences often panicled.....*S. grandifolia.*

Leaflets 3.....*S. grammatophora.*

Leaves more compound; rachis rarely wing-margined (*S. deltoidea*).

Leaves all or mostly with only one pair of ternate or subternate leaflets or obviously pubescent as *S. longistipula;* see page 298.

Indument of leaves (at least one side) or of stems conspicuous, dense, usually in age and flowers large (4.5–6 mm. long); fruit cells (known) often more or less compressed.

Branches slender, long-hispid; leaflets entire; wood simple. *S. altissima.*

Branches slender, strigillose or glabrate as the green membranous leaflets; wood composite. *S. communis* var., *S. dumicola.*

Branches stout, soon 4 (3)-6 mm. thick, usually, as the firm leaflets beneath, densely short-tomentose or hirsutulous.

Indument of branchlets short-hirsutulous; stipules ovate; leaves biternate (Peru).....*S. diffusa.*

Indument of branchlets in type sparse, lax or in var. dense; stipules linear-subulate, leaves imparipinnate. *S. longistipula.*

Indument at least of branchlets closely tomentose; stipules ovate or "lanceolate-subulate" (*S. mollis*); leaves biternate.

Wood composite; epidermis typically lacking mucus.

Panicles solitary or the upper panicled.

Terminal leaflets long-petiolulate (type); pedicels 2 mm. long.....*S. mollis.*

Terminal leaflets shortly petiolulate or subsessile (type); pedicels to 5 mm. long..*S. sufferuginea.*

Panicles paniculately congested (imperfectly known); leaflets all subsessile.....*S. peruviana.*

Wood simple; epidermis containing mucus (as to types; cp. following with *S. mollis*).

Fruit cells alulate; branches scarcely striate (type). *S. aluligera.*

Fruit cells merely callose; branches lightly sulcate (type) ..... *S. calligera.*

Indument never conspicuous unless in inflorescence; fruit cells (known) more or less inflated except *S. communis, S. inscripta, S. leptocarpa.*

Flowers small, 2–3 (3.5) mm. long; sepals equally puberulent and wood composite unless in the last four species and *S. rubicaulis* with exception of *S. pyramidata.*

Leaflets coarsely serrate medially or nearly to base.

Upper stems soon glabrate; leaflets serrate, often below middle.

Serrations subduplicate, approximate from below the middle ..... *S. tenuifolia.*

Serrations simple, irregular, remote, mostly from middle ..... *S. membranacea.*

Upper stems short-hirsutulous; leaflets serrate only above middle ..... *S. rufa.*

Leaflets entire, subentire or serrations obtuse, rounded, remote, few, or stems usually prickly.

Branches deeply 5-sulcate, more or less prickly; wood simple ..... *S. rubicaulis.*

Branches striate or lightly 8-sulcate, smooth; wood composite except as noted above.

Leaflets ample, even the lateral usually several cm. wide.

Leaflets remotely obtusely serrate, often slightly pubescent.

Serrations coarse; fruit wings diaphanous, cells lightly nerved ..... *S. membranacea.*

Serrations small or obscure; fruit wings firm-membranous, cells deeply nerved.

Leaflets acute or acutely acuminate; wood simple ..... *S. exarata.*

Leaflets obtusely short-acuminate; wood composite ..... *S. pyramidata.*

Leaflets entire or bidentate near obtuse acumen, quite glabrous.....*S. grandifolia.*

Leaflets small, even the terminal rarely wider than 3 cm.

Leaflets subequal, all remotely serrulate above the middle.....*S. trirostris.*

Leaflets obviously unequal, all entire or subentire.

Lateral leaflets subrotund, 2.5 × 2 cm., all a little puberulent.....*S. subrotundifolia.*

Lateral leaflets subelliptic, 10 × 4–5 mm., all glabrous except nerves.....*S. Killipii.*

Flowers large (for genus) normally at least 4 mm. long; sepals in part soon glabrate or greenish or the leaflets entire or obtusely few-dentate; wood simple only in *S. exarata.*

Sepals equally cinereous or fulvous puberulent except *S. caracasana* and possibly forms of *S. communis;* leaflets often entire or obtusely few-dentate.

Leaflets oblong-lanceolate, usually at least three times longer than wide.....*S. lethalis.*

Leaflets ovate- or oblong-elliptic, often about twice longer than wide.

Leaflets (lateral) obtuse or obtusely acuminate, quite glabrous (Peru) as outer sepals....*S. caracasana.*

Leaflets acute or acutish, often a little pubescent as outer sepals.

Stem angles, at least in part, very acute or even winged.

Leaves subcoriaceous, lustrous; petioles often in part margined; outer wood bodies triangular. *S. lethalis, S. paucidentata.*

Leaves submembranous, often dull; petioles emarginate; outer wood bodies lamellate. *S. nutans.*

Stems 5–6-striate-angled; branches (early) as inflorescence reddish-puberulent; petioles in part margined.....*S. inscripta.*

Sepals, at least in part, soon glabrate, greenish (unless *S. glabrata, S. exarata*); leaflets, usually at least lateral, acutely, angulately, irregularly or coarsely serrate

often below the middle; wood composite except *S. exarata.*

Leaflets, unless the terminal, obtuse, glabrous (Peru) as outer sepals. . . . . *S. caracasana.*

Leaflets usually acute and as the outer sepals most often slightly puberulent at least on nerves.

Fruit cells subcompressed, cristate; petioles emarginate; leaflets unequal or dissimilar.

Leaflets remotely few-dentate or subentire.

Flowers roseate; leaflets pilosulous beneath, similar. . . . . *S. leptocarpa.*

Flowers yellowish; leaflets glabrate, diverse (var). *S. inscripta.*

Leaflets repand-dentate at least to middle. *S. Alsmithii.*

Fruit cells subglobose; lateral leaflets often smaller than terminal but rarely diverse; petioles obscurely or not margined.

Leaflets lanceolate to somewhat ovate-lanceolate, to about 3 cm. wide; upper stems 2–3.5 mm. thick; fruit cells lightly nerved.

Petioles emarginate; leaflets small, ovate-lanceolate.

Third and fifth sepals connate; stipules about ovate. . . . . *S. communis.*

Third and fifth sepals free; stipules subulate. *S. dumicola.*

Petioles in part margined; leaflets narrowed at each end. . . . . *S. sphaerococca.*

Leaflets usually broadly ovate, often several cm. wide; upper stems soon 4–5 mm. thick; fruit cells deeply nerved.

Wood composite; petioles emarginate; leaflets ample. . . . . *S. glabrata.*

Wood simple; petioles in part submarginate; leaflets 3.5 cm. wide (type). . . . . *S. exarata.*

Fruit cells inflated; petioles in part margined; leaflets dissimilar, the much smaller lateral often sublobulate-dentate. . . . . *S. inflata.*

Leaves usually imparipinnate, all or mostly with more than 1 pair of ternate or subternate leaflets, their divisions often only 1–2 cm. wide (cf. also the pubescent *S. longistipula* and a doubtful specimen of *S. diffusa* might be sought here).

Lower pair of leaflets mostly 5-foliolate or pinnate; wood abnormal except *S. striolata;* flowers 3.5 (3) –6 mm. long, except *S. deltoidea,* unopened in *S. striolata.*

Leaf rachis wing-margined; fruit cells distended. . *S. deltoidea.*

Leaf rachis obscurely or not margined; fruit cells subinflated.

Leaflet divisions mostly or all about 1 (–1.5) cm. wide; flowers large.

Inflorescences subspiciform; peripheric wood columns 5; northern species. . . . . *S. brachyptera.*

Inflorescences rather lax; peripheric wood columns 1–2; southern species. . . . . *S. platypetala, S. squarrosa.*

Leaflet divisions mostly or all about 2 cm. wide; flower buds small; wood normal. . . . . *S. striolata.*

Lower pair of leaflets merely ternate; wood normal except *S. parvifolia;* fruit cells more or less compressed.

Leaflet divisions mostly about 2 cm. wide; flowers 3.5 (3) –6 mm. long.

Ultimate leaf divisions rather oblong-elliptic; young fruit and sepals (type) glabrous or nearly. . *S. fuscostriata.*

Ultimate leaf divisions obliquely obovate; fruit and inner sepals puberulent. . . . . *S. striata.*

Leaflet divisions mostly 1–1.5 cm. wide; flowers 2–2.5 mm. long.

Leaves glabrous or nearly, lacking mucus; wood normal. *S. oxyphylla.*

Leaves barbate in axils and lightly pubescent; wood abnormal. . . . . *S. parvifolia.*

Serjania Alsmithii Macbr., sp. nov.

Scandens, fruticosa; rami 5-angulares inter angulos mediocriter canaliculati, juniores undique, adultiores ad angulos hirtelli; corpus lignosum minus durum, compositum e centrali magno pentagono cavitate medullari sat larga percoso et periphericis parvis angulis centralis superpositis; foliis biternatis; petiolis canaliculato-striatis; foliolis minutissime denseque pellucido-punctatis chartaceo-mem-

branaceis utrinque glabris vel in nervis supra obscure sparseque hirtellis paullo nitidulis subtus pallidioribus oblongo- vel ovato-ellipticis acutis, mucronatis, basi plus minusve attenuatis, subpetiolulatis, repando-dentatis, plerumque 6–7 cm. longis, 3–4 latis, lateralibus paullo minoribus; thyrsi solitarii laxe cincinnigeri, cincinni breviter stipitati, pedunculo rachique tenere puberulis, pedicellis fructiferis circa 4 mm. longis; floribus vix notatis ut videtur 4–4.5 mm. longis, sepalis subglabris circa 3 mm. longis.— Fructus fere ovatus, glaber, valde compressus 3 cm. longus infra medium circa 3 cm. latus basi et apice vix excisi infra loculos vix constricti, alis paullo dilatatis.

Distributed as *S. tenuifolia* which it resembles considerably in foliage but apparently it is rather a member of another section of the genus, probably section *Platycoccus* Radlk. at least sens. lat. It accordingly requires another name for purpose of cataloguing in this work and, if it does not prove to be extra-Peruvian may honor in the same group with *S. Killipii* the famous "botanical brothers," to use the happy term of Croizat.

Loreto: Subligneous vine; fruit pinkish red, Yurimaguas, *Killip & Smith 28301*, type.

Serjania altissma (Poepp. & Endl.) Radlk. Monogr. Serj. 251. 1875: 72. *Cardiospermum altissimum* Poepp. & Endl. Nov. Gen. & Sp. 3: 38. 1844.

Scandent, suffruticose, the deeply 5-sulcate-costate branches 3.5 mm. thick and somewhat pilose-glandular as also setulose with rusty spreading trichomes 3–3.5 mm. long, this sort of pubescence in some degree extending to the inflorescence (this more glandular) and the leaves, these glabrate in age; ligneous structure simple, notably costate, in cross section sinuate or crenate-lobed; stipules subulate-linear, to 6 mm. long, setose, the petioles sparsely so, 8 cm. long, the intermediate ones 5, the lateral 1.5 cm., all striate-sulcate; leaves biternate, often 22 cm. long, 20 cm. wide, membranous, brownish, paler beneath, rather to very obscurely pellucid-punctate, epidermis containing mucus, above sparsely or scarcely, beneath early more or less densely puberulent especially on nerves and somewhat ciliate margins with many sessile glands intermixed, the terminal leaflet long-attenuate to the petiolule, broadly elliptic or subrotund, subobovate, to 9 cm. long, 4.5–5 cm. wide, the lateral smaller, all abruptly and acutely acuminate and entire or rarely with a tooth or two toward the tips; panicles solitary or paniculately

congested, longer than the leaves, the approximate cincinni on stipes 5–15 mm. long, the rather crowded pedicels 3–3.5 mm. long; flowers about 5 mm. long, white; outer sepals puberulent and articulate-glandular, the longer inner very minutely puberulent; petals broadly obovate, the scales half as long, the upper obovate, the lower dentiform; stamens pilose at base; fruit (barely half mature) setigerous.—The fruit described by the authors does not belong here, according to the monographer; in *Williams 4113* it measures 3 by 2.5 cm. scarcely 1.5 cm. at the cells, these setose, carinate by the decurrent wings, the pericarp fragile, seed black. F. M. Neg. 5533.

San Martín: Tarapoto, *Spruce 4560; 4540; Mathews 1322; 1322* bis. Zepelacio near Moyobamba, 12–1,600 meters, *Klug 3596* (det. Standley). Chazuta, *Klug 4104* (det. Standley).—Loreto: Yurimaguas, *Poeppig 2415*, type; *Williams 4113; Killip & Smith 29071.*

Serjania aluligera Radlk. Bull. Herb. Boiss. 1: 464. 1893; 64.

Canescent scandent shrub with subterete scarcely striate branches —ligneous area simple—and upper ternate or 5-foliolate-pinnate leaves, the lower biternate; stipules minute, ovate; petioles 3–4 cm. long, the intermediate 2 cm. long, the lateral 6 mm. long; leaves of the flowering branchlets 10–13 cm. long, 9–10 cm. wide, the oval leaflets serrate-dentate above the middle, mucronulate, the terminal 4–6 cm. long, 2–3.5 cm. wide, attenuate into a petiolule 5–8 mm. long, the lateral gradually smaller, sessile, all pinnate-nerved, subchartaceous, brownish-green, opaque, microscopically glandular, puberulent above, softly ashy pubescent beneath, epunctate, the epidermis containing mucus; thyrsi subcorymbose-racemiform, solitary, divaricate, the flowering part half as long as the peduncle, the cincinni spreading, long (to 1 cm.) -stiped; bracts and bractlets subulate, long-glandular; pedicels about 4 mm. long, in fruit to 7 mm., articulate at lower third; male flowers with inner sepals 5 mm. long, the outer half as long, all ashy puberulent; petals oblong-spatulate, 6 mm. long, 2 mm. wide, glandular within, the scales villous at the margin, the upper crest obcordate-bifid and with long deflexed barbate appendage, the lower obliquely emarginate aliform; stamens lightly pilose, the anthers glabrous; young fruit elliptic, ashy pubescent, rusty villous at apex, the cells compressed at sides and with aluliform processes near the dorsal crest, these hidden in the tomentum, the endocarp glabrous except very sparsely pilose in the angles. F.M. Neg. 5964.

Cajamarca: Callacate, *Jelski 409*, type.

Serjania brachyptera Radlk. Bot. Jahrb. 37: 145. 1905; 63.

Like *S. squarrosa* but the stems 8-angulate and particularly the ligneous peripheral areas 5, the spreading panicles 7–26 cm. long with only 1 cm. long about 5-flowered cincinni, the fruit cells glabrous or sometimes floccose within; petioles 5–10 mm. long; leaves 5–6 cm. long and broad with 3–4 pairs of leaflets, the lower ternate or pinnate, trichomes few; outer sepals ashy hirsute; fruit not mature, subquadrate, glabrous, 1.5 cm. long, at base 1.2–1.4 cm. broad.—It is possible that my *2291*, incomplete, may belong here. F.M. Neg. 5534.

Cajamarca: Hacienda La Tahona near Hualgayoc, 2,600 meters, *Weberbauer 4057*.—Huánuco: Among herbs and shrubs, 3,200 meters, near Punchau, Prov. Huamalíes, *Weberbauer 3304*, type.

Serjania calligera Radlk. Bot. Jahrb. 54: Beibl. 117: 42. 1916; 65.

Much like *S. aluligera* but the sordidly tomentulose tumid fruit cells laterally entirely free scarcely cristate but at the lateral angles above sometimes with a produced callus; branches 4–5-sulcate; petioles 5–10 mm. long, the intermediate 2.5 cm., the lateral 3 mm. long, all more or less rusty tomentulose as the leaves, the larger with terminal leaflet 6.5 × 4 cm.; cincinni approximate on stipes only 2–3 mm. long, the pedicels 2–3 or in fruit 5 mm. long, articulate near base; petals white, 6 mm. long, 3 mm. wide; ovary densely tomentose, the cells villous within, the glabrous style trifid at apex; immature fruit to 1.8 cm. long, 1.4 cm. broad, at the cells 8–9 mm.—Apparently nearly *S. mollis* but the leaves smaller (Dahlem note) and certainly doubtfully distinct from *S. aluligera*.

Cajamarca: Between Huambos and Montán, 2,500 meters, *Weberbauer 4215*, type.—Piura: Hacienda San Antonio, 1,300 meters, *Weberbauer 6011*.

Serjania caracasana (Jacq.) Willd. Sp. Pl. 2, pt. 1: 465. 1799; 91. *Paullinia caracasana* Jacq. Hort. Schoenbr. 1: 52. *pl. 99*. 1797.

Typically nearly glabrous even to the outer sepals, only the branches (apically) and solitary or paniculate inflorescences microscopically glandular and minutely pubescent, the former lightly 6–8-striate, 2–4 mm. thick; wood composite, peripheral areas often about 8; stipules broadly triangular, 2 mm. long, puberulent, as the 6–12 cm. long emarginate petioles, especially at the articulation; leaves usually biternate but variable; leaflets oblong-lanceolate or

subelliptic, mostly gradually and obtusely acuminate, or the lower lateral ones shortly ovate and obtuse, all obtusely serrate-dentate or subentire (Peru), membranous or subcoriaceous, lustrous above, rarely barbate in the nerve axils, punctae and pellucid lines obvious, epidermis lacking mucus, the terminal petiolule 1–1.5 cm. long, its leaflets often 1 dm. long or longer, 3–5 cm. wide or wider; cincinni more or less stiped, 5–11 flowered, the pedicels 3–5 (–7 in fruit) mm. long, articulate above the base; flowers white; outer sepals usually glabrous, inner sordidly puberulent, nearly glabrous within, 3.5–5 mm. long; petals long-clawed, 4.5–7 mm. long, 1.5–2 mm. wide, laxly glandular within; scale-crests more or less emarginate, even bifid or the lower dentiform; stamens lightly villous; fruit purplish above, 2.2–3.8 cm. long, 2–2.5 cm. (at cells 8–9 mm.) broad, little if at all constricted under the cells, truncate-rounded or shortly cuneate at base, ecristate, glabrous except for scattered glands, the endocarp glabrous or with a few trichomes at base and back of cells.—The Peruvian forms are *genuina* Radlk. and *elliptica* Radlk., the elliptic leaflets subentire; cf. *S. Ampelopsis* Pl. & Lind. under *S. inscripta*.

Huánuco: Mito, *1567* (distr. as *S. striata*). Without data, *Ruiz & Pavón*, fide Radlk. Widely distributed in South America, north to Cuba and Mexico.

Serjania communis Camb. in St. Hil. Fl. Bras. 1: 362. 1825; 51.

Slender sarmentose triangulate sulcate branches as the biternate leaves variously pubescent to nearly glabrous; stipules ovate-lanceolate; petioles 2–4 cm. long, scarcely margined; leaves about 14 cm. long, 12 cm. wide, the larger terminal leaflet subrhombic-lanceolate, 5–8 cm. long, 2–3 cm. wide, more or less attenuate to the petiole, the lateral subovate-lanceolate, rounded at base, all acute or obtuse, mucronulate, serrate-dentate, often doubly, membranous to chartaceous, rarely more than obscurely pellucid-punctate or areolate; panicles mostly solitary, the lower twice as long as the leaves, hirsutulous or laxly puberulent especially the small lanceolate bracts and bractlets as also the 4 mm. long pedicels, these equaling the ellipsoid buds; outer sepals half as long as inner, all crisp-pulverulent; petals white, obovate, microscopically glandular within, the upper 5–6 mm. long, 2–3 mm. wide, the half as long scales emarginate or obtuse, sometimes obsolete as also the lateral glands; stamens pilose-puberulent; ovary oblong, little narrowed at base, minutely glandular; fruit cordate-ovate, 2–2.7 cm. long, 1.8–2 cm. broad, narrowed at the pubescent cells (these narrowly cristate),

emarginate at apex, the puberulent wings more or less dilated at base; cotyledons subequal, suberect; seeds ellipsoid.—Radlkofer named three variants in accord with the degree or character of the pubescence, *mollis* Radlk., *pilosula* Radlk. and *glabra* Radlk. The wood structure is central (large, with 3 smaller peripheral columns; cf. the author, Monogr. Serj. Suppl. *pl. 1*). I should like to exclude this from Peru but if the following incomplete specimens actually belong here probably some flowering material cited under *S. inflata* does also, as originally determined. F.M. Neg. 36040.

San Martín: Tarapoto, *Spruce* (var. *glabra*, fide Radlk.).—Junín: Puerto Yessup, *Killip & Smith 26313* (det. Killip). To eastern Brazil.

Serjania deltoidea Radlk. Monogr. Serj. 322. 1875; 203.

Branches obtusely or acutely triangular, lightly striate, the younger reddish tomentulose with crisped trichomes; wood composite with 3 peripheral areas; stipules small, ovate; common petiole emarginate, caniculate above, the leaf-rachi in part winged, the wings narrowed below; leaves deltoid in outline, often 16 cm. long, 12 cm. wide, membranous, glabrous or nearly both sides, lustrous above, subopaque and paler beneath, containing mucus, minutely pellucid punctate, bi- or subtripinnate (upper pinnae simple, the lower pinnate, the pinnules themselves in part pinnate) with 3–4 pairs of ovate-oblong obtuse sessile coarsely dentate or incised leaflets, except the terminal, these 3.5 cm. long, 1.5 cm. wide, petiolulate, elongate-subrhombic with obtusish acumen; panicles solitary or paniculate, slender and interruptedly floriferous, the rachis reddish tomentulose, the dense cincinni subsessile 5–6-flowered with 1 mm. long pedicels articulate at base; outer sepals less tomentose than inner, these 2 mm. long; petals 2 mm. long, half as wide, the upper scales crenulate, the lower subaliform; fruit retrorsely subhirsute, retuse, contracted below the cells, 2.5 cm. long, 2 cm. wide, the endocarp reddish villous, the seed basal. F.M. Neg. 5539.

Huánuco: Chicoplaya, *Ruiz & Pavón*. Near Río Monzón, 600 meters, *Weberbauer 3606*, part. Bolivia.

Serjania dibotrya Poepp. & Endl. Nov. Gen. & Sp. 3: 35. *pl. 242*. 1844; 108.

Glabrate high-climbing liana, the stout somewhat trigonous and striate branches early rusty setulose and microscopically glandular

at the tips, 3–6 mm. thick, the ligneous structure composite with 1–3 peripheral areas; stipules to 2 mm. long, puberulent; petioles to 10 cm. long and rachi to 5, wing-margined (to 6 mm. wide), the leaves 5-foliolate, the lower to 25 cm. long or longer, 2 cm. wide, early especially on the lower surface with a few appressed setae, subcoriaceous, transversely reticulate, densely pellucid punctate, glabrous and lustrous above, containing traces of mucus, paler, dull and glanduligerous beneath, the lateral leaflets to 11 cm. long, 7 cm. wide, ovate, acute or shortly acuminate, the base rounded with short petiolule, the terminal subrhombic little larger, attenuate at base, all obtusely repand-denticulate or subentire; panicles solitary and congested paniculately in the apex of the branchlets, more or less reddish tomentulose, glabrate, densely cinniferous, the cincinni shortly stiped, 7–9-flowered, the pedicels scarcely exceeding 1.5 mm.; flowers hermaphrodite; sepals all tomentulose, the outer as the interior nearly 4.5 mm. long; petals lanceolate-oblong, 5.5–6 mm. long, 1.5 mm. wide, glanduligerous within, the less than half as long scales little villous; anthers glabrous; fruit minutely setulose, about 3.5 cm. long, 2.3–3 cm. wide, cordate at base, obtuse, constricted under the cells, these subglobose and ecristate, the endocarp glabrous except at base of cells. F.M. Neg. 5542.

Huánuco: In woods, Cuchero and Pampayacu, *Poeppig*, type. Chinchao, *Rivero 222*. Pozuzo, *Ruiz & Pavón*.—Junín: Colonia Perené, *Killip & Smith 25204* (det. Killip). Bolivia.

Serjania diffusa Radlk. Monogr. Serj. 302. 1875; 194.

Branches subterete, 6–7-striate and more or less rusty hirsute-tomentose as the solitary panicles, the rachi of these somewhat angled; wood composite with 3 peripheral areas; petioles striate, tomentose-hirsute as the leaf-rachi and the small ovate stipules; leaves triternate (in Mathews specimen biternate), the subrhombic terminal leaflet 8 cm. long, half as wide, with petiolule to 1.5 cm. long, the upper lateral oblong, the lower ovate, sessile, all coarsely incised-dentate, acute or acutish, thick-membranous, above sparsely, on the nerves beneath densely pilose, pellucid punctae hardly discernible, epidermis containing mucus; cincinni crowded on stipes barely 2 mm. long; outer sepals lightly pilose, the inner canescent tomentose, 3.5 mm. long; petals 4.5 mm. long, 2 mm. wide, the upper scale crest emarginate or subentire, the lower dentiform; young fruit oblong, cleft at apex, yellowish canescent, the endocarp white floccose, the seed basal.—Mature fruits of *Solis 10839*, apparently

correctly named, are 15–18 mm. long, the hard cells densely setulose. The author suggests the Mathews plant may not belong here.

Amazonas(?): Pariahuanca (*Mathews 1202*). Bolivia to Colombia.

Serjania dumicola Radlk. Monogr. Serj. 111. 1875; 57.

In general like *S. communis* var. *mollis* but differing in structure of flowers (female not described); stipules small, subulate; third and fifth sepals free; petals 4.5 mm. long, 3 mm. wide; fruit cordate, apically emarginate, little constricted medially, 2.8 cm. long, 2.5 cm. wide, puberulent, the cells subcuneate at base, cristate dorsally.—To be expected in adjacent Peru. Wood structure: medullary cavities small or hardly any.

Peru (probably). Bolivia.

Serjania elongata Macbr. Field Mus. Bot. 11: 28. 1931.

Smooth liana, even the elongate solitary racemiform inflorescences essentially glabrous, these laxly flowered and often 2–3 dm. long; leaves 5-foliolate, the leaflets all entire or sometimes obscurely 1–3-undulate-dentate, broadly elliptic, very obtuse or rounded at both ends except the cuneately based and petiolulately contracted terminal, mostly about 6 cm. wide, 10 cm. long, chartaceous, moderately reticulate and lustrous on both sides, scarcely pellucid punctate or lineolate; rachis and petiole not at all margined; inflorescence branchlets only 2–4 mm. long or in fruit apparently about twice as long, the flowers usually 4 or few; pedicels slender, barely 2 mm. long in flower; sepals about 2–2.5 mm. long, glabrous except the slightly longer inner, these a little tomentulose; petals obovate, about 3 mm. long, slightly barbate within at base; filaments short-pilose; fruits obcordate, glabrous, about 2.5 cm. wide and long, the cells compressed.—Description of fruit from *Krukoff 10967* referred by A. C. Smith to an apparently unpublished species name of Rusby, which appropriately defines the shape of the leaflets.

Junín: In sunny brush, La Merced, *5511*, type.—Loreto: Trail to Tarapoto, *Ferreyra 4954*. Bolivia.

Serjania exarata Radlk. Monogr. Serj. 166. 1875; 110.

Similar to *S. membranacea* but rather more hirtellous and especially leaflets acute or acuminate, less coarsely, even obscurely serrate and the fruit manifestly dilated at base, glabrous, the wings chartaceous, the divaricate cells deeply exarate between the veins; fruit 2.5 cm.

broad, 3.5 cm. long; inner sepals 3 mm. long; petals 4 mm. long, 2.5 mm. wide.—Simulates *S. glabrata* but presumably distinct by the simple wood (as to type); compare also *S. pyramidata*. *Klug 3707* only in flower may be distinct; the leaflets are abruptly acuminate, about 1 dm. long, half as wide, obscurely dentate, inflorescences to 3 dm. long; without fruit doubtfully belonging here but for expediency it may be designated var. **extensa** Macbr., var. nov. foliolis ad 5 cm. latis, obscure serratis abrupte subcaudato-acuminatis inflorescentibus valde elongatis.

Huánuco: Pampayacu, Río Chinchao, *5049* (distr. as *S. sphaerococca*).—San Martín: Zepelacio near Moyobamba, *Klug 3707?* (det. Standley, *S. altissima*). Amazonian Brazil.

Serjania fuscostriata Radlk. Bot. Jahrb. 37: 147. 1905; 171.

Allied to *S. oxyphylla* and in general similar but the somewhat larger leaves imparipinnate with 3 pairs of unequally serrate-dentate leaflets, the lower pinnae ternate, the next mostly bifoliate, the upper simple, sometimes one or the other as the terminal leaflet more or less modified; cincinni stipes about 5 mm. long, the pedicels 4 mm. long, articulate below the middle; inner sepals 4 mm. long, the outer especially ciliate; petals 3.5–4 mm. long, the scales villous at margins, the crest of the upper deeply bifid; fruit unknown.—To this I refer with some doubt, the leaves incomplete and no flowers, my own collection which once I determined as *S. brachyptera*, that, as to type, with much smaller leaflets; the glabrous fruits are 2 cm. wide and long, the cells subinflated, the rachis densely hirtellous, the upper stems puberulent. F.M. Neg. 5548.

Ancash: Below Pampa Romas, among trees near brook, 1,900 meters, *Weberbauer 3183*, type; 163.—Huánuco: On canyon shrubs, *2291*.

Serjania glabrata HBK. Nov. Gen. & Sp. 5: 110. 1821; 113.

Older branches triangular, glabrate, the younger typically sparsely pubescent but often densely and softly, 6–8-nerved; ligneous structure composite with 3–5 peripheral areas; stipules 1–1.5 mm. long, ovate, puberulent; petioles 5–7 cm. long, the intermediate 4–6 cm., bisulcate above, all emarginate; leaves finally ample, biternate, membranous, pale green, usually containing mucus, obsoletely pellucid punctate and lineolate, glabrous above, laxly to densely and softly pubescent beneath, the slightly larger terminal leaflet sometimes 13–15 cm. long, 6–8 cm. wide, often smaller,

attenuate to petiolule 5–12 mm. long, subrhombic, the lateral shortly contracted to the petiolules, all acute or subacuminate, unequally and coarsely crenate, serrate or subrepand dentate; panicles solitary and paniculately congested, the rachi sulcate-angulate, the 5–16-flowered cincinni shortly stiped; pedicels 2–3 mm. long, articulate near base or nearly at middle, puberulent; outer sepals much shorter, glabrate or much less pubescent than the 3–4 mm. long whitish-tomentulose inner ones; petals white, 3.5–5 mm. long, 1–2 mm. wide, the upper scales subentire to dentate, the lower bicornute; fruit usually 3–4 cm. long, 2–3 cm. broad, cordate-ovate, hardly retuse, contracted under the cells, pilose or finally glabrate, the cells transversely obovoid, divaricate or obliquely erect, sulcate- and scrobiculate-exarate, the endocarp floccose.—Forma *genuina* Radlk. is more glabrate than the commoner forma *mollior* Radlk., the sepals distinctly diverse in degree of indument, the pedicels articulate near base, the large fruit glabrate. F.M. Neg. 5549.

Stems, macerated, used as a fish "poison" (Mexia); vine to 4 meters high, stems purplish, leaves soft, thin, glossy, paler beneath (Woytkowski); flowers fragrant.

Piura: Canchaque, Prov. Huancabamba, *Stork 11397*.—Cajamarca: Colasai on the Río Huancabamba, *Bonpland*, type. Callacate, *Jelski 415*. Tambillo, *Jelski 328*.—San Martín: Tarapoto, *Spruce 4139* (part); *Ule 6534; Williams 5419; 5680; 5854; 5908; 6261;* low woods and stream thickets, *Woytkowski 35055; 35139* (both det. Cuatrecasas). San Roque, *Williams 7243; 7377; 7754; 7800*. Zepelacio, *Klug 3370* (det. Standley).—Huánuco: White-flowered vine in sunny shrubs, *4656; Ruiz & Pavón* (the last det. Melchior).—Junín: La Merced, *5240*. Near Perené Bridge, *Killip & Smith 25401* (in part *S. rubicaulis*).—Loreto: Cachipuerto, *Klug 3125* (det. Standley, by slip of pen, *"Paullinia"*). Santa Rosa below Yurimaguas, *Killip & Smith 28719* (det. Killip). Iquitos, *Mexia 6504* (det. Standley). Florida, Río Putumayo, *Klug 2080?* (young).—Río Acre: Seringal San Francisco, *Ule 9556; 9557*.—Cuzco: Santa Ana, *Cook & Gilbert 1640*. Paraguay to Ecuador. "Macote" (Williams; Mexia); "verap" (Killip & Smith).

Serjania grammatophora Radlk. Monogr. Serj. 258. 1875; 152.

Notable in Peru by the simply ternate leaves, the three broadly ovate (or the lateral, sometimes rather oblong-elliptic) leaflets remotely repand-dentate or rarely sub-lobulate, all subsessile and

mucronulately obtuse or shortly acute, shortly or the terminal long-attenuate at base, not very unequal, often a dm. long or longer, and about half as wide, early as the 6–7-sulcate stems, more or less ashy pilose, glabrate in age, membranous, both sides minutely glandular, pellucid punctate and lineolate, the epidermis lacking mucus; wood simple; stipules minute; petioles emarginate, 4–5 cm. long; inflorescences solitary, 6–12 cm. long, cincinni subsessile, ashy tomentose including the sepals, the much longer inner 3.5–4 mm. long, the basally articulate pedicels 1.5–2 mm. long; petals white, 5.2 mm. long, upper scales biappendaged; anthers puberulent.—The type grown at Munich from seed, its origin unknown but similar species are from the region of Guayaquil, Ecuador, *S. longipes* Radlk., 151, and *S. brevipes* Benth., 151, in both of which the leaves are obsoletely or most minutely punctate; in the former the elliptic leaflets are subentire, the cincinni stiped, while in the latter the leaflets are evenly 2–6-denticulate, the petals less than 3 mm. long. F.M. Neg. 5968.

Peru(?): See note above.

Serjania grandifolia Sagot, ex Radlk. Monogr. Serj. 166. 1875; 112.

Glabrous except the slightly pulverulent inflorescence including the unequally, or in Peru subequally, puberulent sepals; wood simple; stems 3–4 mm. thick; leaves biternate but not rarely reduced, the lower leaflets often simple; terminal leaflets well-petiolulate, 8–12 cm. long, 3.5–5 cm. wide, the lateral little smaller, all subentire or entire, about oblong to broadly elliptic, obtusely short-acuminate, coriaceous, lustrous at least above, obsoletely punctate and lineolate, containing mucus; petioles canaliculate; petioles minute, broadly ovate; inflorescences solitary, congested apically or on subleafless branchlets; cincinni shortly stiped, the pedicels about 2 mm. long; outer sepals in type subglabrous, nearly half as long as the tomentulose inner, these scarcely 2.5 mm. long; petals nearly 3 mm. long, glandular within; stamens basally pilose; fruits glabrous, reddish, attenuate from cordate base, there about 3.5 cm. wide, at cells 1.4 cm. wide, to 5.5 cm. long, the ligneous sutures often bilamellately produced.—The Peruvian liana seems to belong to this species typically of the Guianas but may prove to be different when completely known; in flower the only marked distinction apparently is the more pubescent outer sepals; for convenience it may now be noted as var. **pubisepala** Macbr., var. nov. forma typica differt

sepalis plus minusve tomentulosis indumentum haud vel paullo diversis.—*Klug 965*, type. F.M. Neg. 5550.

Loreto: Near Iquitos, *Klug 876; 884; 965; Williams 8077*. French and Dutch Guiana; Amazonian Brazil.

Serjania inflata Poepp. & Endl. Nov. Gen. & Sp. 3: 36. 1844; 177.

Nearly glabrous, the branches acutely 6-angled and thus 6-sulcate, sparsely crisp-pubescent, the flowering about 3 mm. thick; wood composite with 2–3 small peripheral areas; stipules small, ovate; petioles in part narrowly margined; leaves biternate, about 1 dm. long, nearly as wide, the ovate-oblong subrhombic acute terminal leaflets attenuate to petiolule, 5 cm. long, 2.5 cm. wide, the others smaller, sessile, obtuse, even nearly orbicular, all remotely serrate and at base sublobed, dark green, subcoriaceous, sparsely crisped pubescent beneath and above on the nerves, more or less pellucid with small dots, the epidermis containing mucus; panicles solitary, minutely puberulent, the cincinni stipes 2–3 mm. long, the pedicels 2–4 mm. long, in fruit twice as long, articulate below or at the middle; outer sepals slightly puberulent, the inner densely, 3.5–4 mm. long; petals 4.5 mm. long, 1.5 mm. wide, the scales about two-thirds as long, the upper bifid, the lower emarginate; style glabrous; fruit glabrous, cleft both ends, 3 cm. long, nearly 2 cm. wide, inflated above, the seed below the middle of the cells.—*S. rigida* Radlk., forma *glabra* Radlk., 175, of Brazil, has less acutely angled branchlets, the leaf nerves very rigid beneath. Probably at least sens. lat. should include *S. rigida* and apparently there is also an Ecuadorean form. F.M. Neg. 5555.

San Martín: Tocache, *Poeppig 1965*, type. Tarapoto, *Williams 6568*. Caceres, Prov. Marisca, *Ferreyra 4465*.—Huánuco: Near Río Monzón, *Weberbauer 3606*, part; 286. Pozuzo, *Ruiz & Pavón* (in herb. as *Paullinia curassavica*).—Junín: San Ramón, *Killip & Smith 24756?* (dist. as *S. communis*). La Merced, *5360; Killip & Smith 25408?* (dist. as *S. communis*).—Loreto: Mishuyacu, *Klug 2557* (det. Standley but aberrant).—Cuzco: Quillabamba, Prov. Convención, *West 7197*.

Serjania inscripta Radlk. Bot. Jahrb. 37: 145. 1905; 62.

Branches 5–6-angulate, canaliculate, 4–5 mm. thick, puberulent-tomentulose at least above as the petioles and the solitary elongate inflorescences; wood composite, the peripheric columns small, 3,

angled; leaves biternate, the leaflets oval-lanceolate, remotely crenate-dentate, the terminal and upper lateral 8–9 cm. long, 3–3.5 cm. wide, the lower lateral 3–5.5 cm. long, 2–2.5 cm. wide, obtuse, the others all acute or subacuminate, more or less attenuate to the sessile base, membranous, glabrous above except the obliquely ascending nerve, sparsely pilose beneath, notably marked with impressed lines and pellucid punctae above, the epidermis containing mucus, the intermediate petioles narrowly wing-margined; stipules minute, deltoid; inflorescences with the long peduncle 1.5–nearly 3 dm. long; cincinni stipes about 1 cm. long; pedicels 3–4 mm. long, to twice as long and medially articulate in fruit; flowers about or little longer than 4 mm., the free sepals subequal and equally tomentulose; petals glandular within the half as long scales with deflexed villous appendage; fruits cordate, glabrous or the compressed cells villous, at least 2.5 cm. long, about 2 cm. wide.—Suggests *S. leptocarpa* with larger flowers and more strongly serrate leaflets. The specimen from Cutervo has fruits 3.5 cm. long, the stems glabrate, petioles obscurely margined, leaflets diverse, the roundish lateral 1–3-dentate and may not belong here, even as a variant; it suggests some specimens of *S. Ampelopsis* Pl. & Lind., 58, of Ecuador if that species is variable enough to include them but as to type it seems to differ in its simple wood, subequal ovate-lanceolate acute or acuminate leaflets all entire and even the lateral with petiolules to 2 cm. long. F.M. Neg. 5556.

Ynes Mexia found the macerated stems used as a fish "poison."

Cajamarca: Izco, Prov. Cutervo, *Stork & Horton 10210* (det. Standley, *S. pyramidata?*).—Loreto: Iquitos, *Mexia 6504* (det. Standley, *S.*—by slip of pen, *"Paullinia"—glabrata*). Lower Río Nanay, *Williams 612*. Fortaleza near Yurimaguas, *Klug 2812* (det. Standley, *S. rubicaulis*). Bolivia; adjacent Brazil. "Macote" (Mexia).

Serjania Killipii Macbr., sp. nov.

Scandens, fruticosa; ramis superioribus petiolis pedunculisque gracilis multistriatis minute subhirsutulo-puberulis; corpus lignosum compositum e centrali majore et peripheriçis circa 8 paullo minoribus et centrali cingentibus; foliis biternatis; foliolis integris glabris vel subtus ad nervos obscure pubescentibus, minute pellucido-punctatis, valde diversis superioribus oblongo-lanceolatis vel terminalibus paullo obovatis ad basin breviter attenuatis acutis vel interdum obtusis 3.5–4 cm. longis, circa 1.5 cm. latis, lateralibus paullo

minoribus inferioribus similibus sed lateralibus vix 1 cm. longis, 4–5 mm. latis; thyrsi solitarii et in apice ramorum paniculatim congesti dense cincinniferi, cincinni vix stipitatis; pedicellis circa 2 mm. longis; sepalis exterioribus 1.5 mm. longis dense puberulis tamen sepalis interioribus; petalis anguste obovatis circa 3 mm. longis; filamentis pilosis; fructibus ignotis.

There are notes by Killip on the type sheet suggesting that this is near *S. trirostris* with "larger serrate leaflets," while the leaves exactly match those of *S. gracilis* Radlk. of Brazil, a species with larger flowers; in the absence of fruits its position of course is uncertain but it does seem to be related to *S. trirostris* and *S. subrotundifolia;* indeed it may prove with more collections to be a part of the latter but in this case there must be considerable variation in the size and shape of the leaflets.

Loreto: Masisea, *Killip & Smith 26853*, type (U. S. National Herbarium).

Serjania leptocarpa Radlk. Monogr. Serj. 112. 1875; 57.

Scandent, subherbaceous, the younger subterete-trigonous striate-sulcate, 6-costate branches, thyrsi, petioles and leaflets both sides more or less pubescent with short curved trichomes, finally glabrate; branches brownish, 2–3 mm. thick; stipules minute; petioles 5–7 cm. long, the intermediate little shorter, the lateral 1.5-2 cm. long, the larger biternate leaves 18–22 cm. long, 16–18 cm. broad, the basally attenuate terminal leaflets about 9 cm. long, 4.5–6 cm. wide, the basally rounded lateral ones 5–8 cm. long, 3–4 cm. wide, all ovate, acute or subacuminate, angulately bi- or tridentate or subserrate, subpetiolulate, glabrescent, membranous, drying brownish, obscurely pellucid-punctate or -areolate; thyrsi solitary, elongate, exceeding the leaves, the smaller often paniculately congested in branchlets; buds 4.5–5 mm. long subequaling the nearly glabrous pedicels; flowers in type pale rose, the subglabrous outer sepals half as long as the whitish puberulent inner, the third and fifth barely coalescent at base; petals clawed, obovate, about 8 mm. long, 3.5 mm. wide; upper scales dilated, the lower dentiform; stamens short-pilose; ovary obversely pyramidal triquetrous; fruit glabrous except microscopically glandular, 4–4.5 cm. long, 2.5–3 cm. broad, little constricted below the cells, excised base and apex, the wings obscurely dilated at base.—Wood structure, Radlk. l.c. Suppl. *pl. 3*, the medullary cavity large. The Peruvian material placed here with some doubt. Illustrated, Mart. Fl. Bras. 13, pt. 3: *pl. 58*.

Huánuco: Near Chinchao, *Ruiz & Pavón*, (part; cf. *S. pyramidata*).—Río Acre: Seringal Auristella, *Ule 9558*. Bolivia; Brazil.

Serjania lethalis St. Hil. Hist. Pl. Remarq. Brésil 1: 206. 1824; 138.

High climbing glabrate liana, the stems obtusely triangular, the branches subglabrous to subtomentulose, about 3 mm. thick, more or less 6-striate and obscurely trigonous; ligneous structure composite, with 3–4 triangular peripheral areas; stipules ovate, minute; petioles sulcate above, the intermediate especially often narrowly margined; leaves biternate, the lower 26 cm. long, 24 cm. wide, all sometimes on nerves a little pubescent or ciliate marginally, otherwise mostly glabrous both sides except for microscopic glands, lustrous, coriaceous, obsoletely pellucid punctate, containing traces of mucus; leaflets lanceolate, narrowed both ends, sessile, obtuse or obtusely prolonged into a linguiform acumen, entire or 1–3-dentate, the terminal 9–15 cm. long, 3–4.5 cm. wide, the lateral little smaller; thyrsi solitary or congested, the subsulcate rachi tomentose, the mostly well-stiped cincinni 6–9-flowered, the pedicels 3–6 mm. long, articulate near base; outer sepals shorter, the inner 3–4 mm. long, all lanate-tomentose; petals 4–4.5 mm. long, 2–2.5 mm. wide, the scales more or less bifid; fruit cordate at base, where 2–2.5 cm. broad, 2–3 cm. long, little if at all contracted under the cells, these subglobose, lanate-tomentose, scarcely cristate, the lustrous wings nearly glabrous, the endocarp more or less villous.—Ex range the Peruvian plant could be *S. nutans* or *S. paucidentata*, especially the latter, which compare.

St. Hilaire and Radlkofer, Monogr. Serj. 229, have discussed the toxic qualities of this plant, used as a "fish poison" and said to be injurious to other animals including man.

San Martín: Tarapoto, *Spruce 4892* (det. Radlk.). Bolivia to eastern Brazil. "Timbo"; "Sacha."

Serjania longistipula Radlk. Bot. Jahrb. 37: 148. 1905; 177.

More or less pubescent, the 3-angled lightly sulcate branches typically with only a few long subsetaceous deciduous trichomes or in variant densely hirsutulous-pilose; wood composite with 3 peripheral areas; stipules linear-subulate, pilose, 8–10 mm. long; petioles 3–5 cm. long, the lateral 1.5–2 cm. long, all emarginate, striate; leaves imparipinnate with 3 pairs of oval obtuse sessile or nearly sessile leaflets, the terminal attenuate to petiolule, 7–11 cm. long,

3–4.5 cm. wide, the lateral smaller, rounded at base, all subserrate about the lower half, membranous-chartaceous, minutely pellucid-punctate and lineate, containing mucus, above on nerves densely, between them sparsely pubescent with subsetaceous curved appressed trichomes, the pubescence beneath shorter and softer; lowest pair of leaflets ternate or 5-foliate-pinnate; panicles solitary, the cincinni shortly stiped, the pedicels 4 mm. long, articulate below the middle; outer sepals minutely, the inner ashy puberulent, 4 mm. long; petals 4.5 mm. long, the villous scales with deflexed appendage; young fruit slightly emarginate, somewhat yellowish tomentose, the endocarp white-villous.—Apparently there is a variant with more pubescent stems and more acute leaflets, the Stork and Horton specimen less extreme in these characters; it may be known as var. **aberrans** Macbr., var. nov., foliolis plus minusve acutis, ramulis dense piloso-hirsutulis.—*Weberbauer 7878*, type. F.M. Neg. 5561.

Apurímac: Prov. Andahuaylas, 2,800 meters, *Stork & Horton 10735* (var. det. Standley, *Paullinia*).—Cuzco: Marcapata Valley above Chilechile, *Weberbauer 7878* (type, var. det. Macbride, *S. diffusa*).—Puno: Among shrubs, 2,100 meters, *Weberbauer 518*, type; also *537;* 237.

Serjania membranacea Splitgerber, Pl. Nov. Surinam. in Hoeven & Vriese, Tijdschr. Nat. Gesch. 9: 11 (105). 1842; 109.

Scandent, little pubescent, the younger branches slightly and obtusely 5–6-angled, lightly pilose or at the apex hirtellous, the older subterete, multistriate, glabrate; ligneous structure simple; stipules minute, broadly triangular; petioles 5–6 cm. long, the intermediate 2.5 and the lateral 1 cm. long, bisulcate and pubescent above; leaves biternate (sometimes reduced), minutely pellucid-punctate, containing mucus, hirtellous only on the nerves above where lustrous, beneath paler, dull and longer pubescent on the nerves, the larger 14 cm. long, 12 cm. wide; leaflets about 5 cm. long, 3 cm. wide, shortly ovate, remotely and coarsely blunt-dentate, the little larger terminal contracted to the petiolule, the lateral subsessile, all obtuse or shortly with mucronulate acumen; panicles solitary and paniculately congested, the cincinni stiped, 7–9-flowered, the pedicels 2 mm. long, subglabrous, articulate near the base or at about one-third; sepals all more or less puberulent, the nearly twice as longer inner hardly 2.5 mm. long; petals 2.5–3 mm. long, 1 mm. wide; scales about as in related species, tomentose at margins; anthers glabrous; fruit slender, cordate at the little dilated

base, 2 cm. broad, 3.5 cm. long, retuse, glabrous with diaphanous wings, the divaricate cells depressed between the transverse nerves, the endocarp floccose.—The Lechler specimen was possibly mislabeled as suggested by Radlkofer; if Peruvian, see *S. exarata* or *S. leptocarpa* to which also the rest of the material cited here could be referred except that it has the smaller flowers of *S. membranacea;* the simulating *S. tenuifolia* has sessile cincinni. F.M. Neg. 23670.

Loreto: Timbuchi on Río Nanay, *Williams 970* (distr. as *S. leptocarpa*). Maquisapa, Upper Río Nanay, *Williams 1199* (distr. as *S. exarata*). Manfinfa, Upper Río Nanay, *Williams 1091* (distr. as *S. leptocarpa*).—Puno: San Gován, (*Lechler 2332*). Guiana; Costa Rica. "Novia sisa" (Williams).

Serjania mollis HBK. Nov. Gen. & Sp. 5: 108. 1821; 67.

More or less rusty tomentulose—or the younger parts as the sepals ashy—the stout 5–6-costate branches 4–6 mm. thick, obtusely striate between the ribs; ligneous structure composite, the peripheral areas 3–5; stipules lanceolate-subulate; petioles 3–4 cm. long; upper leaves ternate, to 14 cm. long, 12 cm. wide, the leaflets ovate, crenate or subserrate-dentate, obtuse, rounded and subcordate at base or the larger subtrilobed terminal ovate and decurrent into the 2 cm. long petiolule, 9–11 cm. long, 7–8 cm. wide, the lateral little smaller, subsessile, all tomentose-pilose, or in age scabrous above, most obscurely if at all pellucid-punctate, epidermis lacking mucus; panicles equaling the leaves, the cincinni shortly stiped; bracts and bractlets 4 mm. long; inner sepals 5 mm. long, canescent both sides; petals not known, pedicels 2 mm. long; fruit broadly cordate-ovate, 2–3 cm. long, 2.4–4 cm. broad, emarginate and with short hirsute style at tip, deeply cordate at base by the long-produced wings, tomentose and hirsute, the cells broadly cristate dorsally and usually cornigerous, the endocarp arachnoid-floccose, the seed affixed above the base of the cells.—My specimen had fragrant greenish-white flowers with yellowish centers; it is probably *S. sufferuginea,* as the following except the Cajamarca specimens, if that is distinguishable. However, the monographer has *S. mollis* in his section *Ceratococcus* and the latter in section *Physococcus,* the former with rather compressed fruit cells, medially tumidulous, laterally corniculate, alulate or callose produced while the latter section is described as having cells inflated, scarcely ever cristate; these sections may be distinct as regards other species but scarcely in respect to these plants. F.M. Neg. 5564.

Cajamarca: Between Guerocotillo and Montán, *Bonpland*, type. Monte Seco, Prov. Hualgayoc, 1,800 meters, *Soukup 3831* (distr. *S. ferruginea*).—Huánuco: Muña, *3905*.—Ayacucho: Aína, *Killip & Smith 22455*.—Cuzco: San Miguel, Urubamba Valley, *Cook & Gilbert 977*.

Serjania nutans Poepp. & Endl. Nov. Gen. & Sp. 3: 36. *pl. 242*. 1844; 144.

With the habit and pubescence of the allied *S. lethalis;* branches (typically) acutely 6–8-angled, the ligneous structure more composite; larger leaves 32 cm. long or longer, 20 cm. wide, membranous, glabrous or early with some scattered reddish trichomes on nerves both sides, paler beneath, pellucid-punctate, sometimes not containing mucus, the leaflets obovate, the lower lateral elliptic, the terminal to 14 cm. long, half as wide, all cuneate at sessile base, obtuse or shortly acuminate, subentire or remotely crenate-dentate; panicles solitary, laxly flowered, reddish puberulent, the short cincinni sessile or nearly, the pedicels 8 mm. long, articulate above the base; sepals all ashy-tomentulose, the inner 5.2 mm. long; petals 9 mm. long, 4 mm. wide, the upper scales subentire to bifid; style scarcely 1 mm. long, puberulent; fruit 3.5 cm. long, 2.2 cm. broad (Bolivian species), 2.5–3 cm. long, the cells hispid (Peru), horizontally truncate at base according to Poeppig who noted the petioles as margined, emarginate fide the monographer.—It is possible this may emerge with several other similar extra-Peruvian forms including *S. paucidentata* and *S. lethalis*.

San Martín: Tocache, *Poeppig 1897*, type.—Loreto: Balsapuerto, *Klug 3081* (det. Standley, *S. glabrata*). Masisea, *Killip & Smith 26852*. Yurimaguas, *Killip & Smith 27573*.—Río Acre: Seringal San Francisco, *Ule 9559*. Bolivia; Brazil.

Serjania oxyphylla HBK. Nov. Gen. & Sp. 5: 112. 1821; 170.

Scandent shrub, but the leaves beneath on nerves and margins a little puberulent and the rachises of the solitary or congested panicles tomentose-hirtellous; branches about 10-striate, 10-costate, the ligneous structure simple; stipules small, ovate-acuminate; petioles striate, emarginate or the secondary slightly margined; leaves 11–16 cm. long, 9–14 cm. wide, biternate or the terminal leaflet 3-lobed or dissected, the lower pinnae ternate, the others simple; terminal leaflet 6 cm. long, 2.5 cm. wide with petiolule 12 mm. long, the lateral gradually smaller, sessile, ovate-elliptic to sub-

rotund, usually acute or acuminate, remotely and obsoletely to conspicuously serrate or incised, membranous, glabrous and brownish-green above, paler beneath, pellucid-punctate and lineolate, lacking mucus, the few nerves oblique-erect; cincinni 6–9-flowered, the lower with stipes 2 mm. long; pedicels glabrous, articulate at base, becoming 2 mm. long; inner sepals 2–2.5 mm. long, all merely ciliolate or fimbriate; petals 2 mm. long, about 0.7 mm. wide, the upper scales crenulate or subbifid, the lower uncinate-corniform; fruit shortly ovate or elliptic, cleft both ends, 1.5 cm. long, 1.2 cm. broad, scarcely contracted below the cells or dilated at base, the cells 7–8 cm. long, 6 cm. wide, inflated apically, glabrate, the endocarp glabrous. F.M. Neg. 5568.

Cajamarca: Near Querocotillo, Jaén de Bracamores, *Bonpland*, type. Callacate, *Jelski 410*, part.

Serjania parvifolia HBK. Nov. Gen. & Sp. 5: 113. 1821; 172.

Resembles *S. oxyphylla* but the branches about 8-sulcate, the ligneous structure composite with 3–5 peripheral areas, the tips as the petioles, leaf-nerves beneath with some small trichomes, otherwise glabrous or nearly; leaflets 3 pairs, the lower ternate, the rest simple, the terminal leaflet about 1.5 cm. long, 6 mm. wide, attenuate to petiolule, acutish, the lateral obtuse, ovate or oblong, subsessile, all mucronate, crenate-serrate, subcoriaceous, paler and in nerve axils beneath barbate, obsoletely pellucid-punctate, the epidermis containing mucus; stipules minute; petioles including the lateral not margined; panicles solitary, the cincinni on stipes 1.5–3 mm. long; fruiting pedicels 3 mm. long, articulate near base; inner sepals 1.8 mm. long, all nearly glabrous; fruit glabrous, 8–9 mm. long and about as broad, the cells well-produced and inflated above, wing-dilated below the middle. F.M. Neg. 5571.

Cajamarca: Tomependa, *Bonpland*, type. Callacate, *Jelski 410*, part.

Serjania paucidentata DC. Prodr. 1: 603. 1824; 141.

Scandent essentially glabrous shrub, the younger branches, these 2.5–4 mm. thick, and inflorescences sparsely pubescent or glabrate; branches canaliculate, 6-angulate, the alternate angles more acute or rarely costately obtuse; wood composite, the 3 peripheral columns small, oblong; stipules small, ovate; leaves biternate, the leaflets elliptic or oblongish, the larger terminal more or less abruptly and marginally petiolulate often to a dm. long, about half as wide, all

typically with a short linguiform acumen with 1–4 depressed teeth below it on each side, lustrous or subopaque, membranous-coriaceous, obsoletely and minutely pellucid-punctate, the epidermis containing mucus; petioles usually margined only above; inflorescences solitary or apically panicled, sometimes 2 dm. long or longer, the cincinni stipes 3–10 mm. long, 7- rather many-flowered; pedicels about 2 mm. long; sepals all ashy-tomentulose, the longer inner 3.5 mm. long; petals oblong, attenuate below, 4.5 mm. long, glanduliferous within, twice as long as the scales; fruits triangular from the cordate-excised base, nearly 3 cm. long, nearly 2 cm. wide or at the pilose ovoid or ellipsoid cristate cells 7 mm. wide, finally glabrate.—Very much like *S. lethalis* unless the acutely angled branches and other perhaps minor characters serve to distinguish it; with that species it is the earliest name for closely allied forms. F.M. Negs. 5616; 33410.

San Martín: Tarapoto, *Williams 6100*.—Loreto: Pumayacu, between Balsapuerto and Moyobamba, *Klug 3196* (det. Standley, *Paullinia grandifolia*). Amazonian Brazil to Trinidad and Tobago.

Serjania peruviana Radlk. Monogr. Serj. Suppl. 154. 1886; 193.

Branches as the paniculate panicles sordidly canescent tomentulose, the former subterete but 6-sulcate, the rachises of the latter terete, not sulcate-angled; wood composite with 3–4 peripheral areas; stipules unknown; petioles all emarginate, ashy tomentose; leaves biternate, the terminal leaflet 6 cm. long, 3.5 cm. wide, subrhombic, the smaller lateral ones ovate, all subsessile, subacute, crenate-dentate, thick-membranous, pubescent above, tomentose beneath, nearly epunctate, the epidermis lacking mucus; cincinni stipes only about 3 mm. long, the pedicels as long, articulate near the base, sepals all canescent, the inner 4.5 mm. long; petals 5.5 mm. long, 3 mm. wide, the upper oblong scale crest approximately as long, the lower small, wing-like; stamens hirsute.—Otherwise unknown and not seen by me but without fruit its position remains uncertain until re-collected; except for the "apically paniculately congested panicles" it seems to be, probably, a part of *S. mollis* or (and) *S. sufferuginea;* well-developed specimens of the latter at least have paniculate inflorescences and the length of the cincinni stipes appears to depend on age.

Amazonas: Chachapoyas (*Mathews 3094*, type, herb. Kew).

Serjania platypetala Radlk. Bot. Jahrb. 54: Beibl. 117: 42. 1916; 64.

Resembles *S. squarrosa;* branches sulcate, 6–10 costate, with only 1 peripheral ligneous area; stipules minute, subulate; leaves membranous, with a few subsetaceous trichomes above, glabrate beneath, the terminal 1.5–3 cm. long, 1–1.5 cm. wide, the lateral not more than half as large, oval or suborbicular; panicles to 3 dm. long including the 8–10 cm. long peduncles; pedicels to 6 mm. long, articulate below the middle; outer sepals glabrous; the inner 5 mm. long; petals 6–7 mm. long; lateral glands obsolete; fruit shortly ovate-subquadrate, laxly puberulent at tip, endocarp sordidly (instead of white as in related species) villous, 1.5 cm. long, 1.3–1.5 cm. broad.—The author distinguished this by the membranous leaves, longer inflorescences and cincinni stipes, smaller ovate-subquadrate fruit. It seems to me doubtful that these characters are significant.

Ayacucho: Near Ayacucho, rocky slopes among shrubs, 3,000 meters, *Weberbauer 5506*, type.

Serjania pyramidata [R. & P.] Radlk. Monogr. Serj. 155. 1875; 99.

Character in general that of the similar *S. sphaerococca* but the petioles all (or the intermediate obscurely margined) emarginate, the leaflets ovate-elliptic, remotely and obtusely serrate above the middle, a little pilose on the midnerve both sides as well as in the axils beneath, the lower 2 dm. long, nearly as wide, the terminal leaflet 1 dm. long, 4.5 cm. wide, all sessile or nearly; pedicels 1.5–2 mm. long, in fruit 2.5 mm. long; outer sepals sparsely puberulent, the inner ashy-tomentulose, 2 mm. long; petals 2.5 mm. long, 1 mm. wide, the scales villous at margins, the upper with deflexed appendage; fruit 3 cm. long, 2.2 cm. broad, the coarsely veined cells obviously obliquely cuneate at base instead of globose and obscurely cuneate as in the related species.—In herbaria as *Paullinia pyramidate* R. & P. Here might be sought *S. mucronulata* Radlk., 173, of southern Ecuador intermediate in character of fruit to two sections (Radlkofer), among Peruvian species nearest perhaps to *S. inflata* with rather similar leaflets but somewhat larger flowers and inflated fruit cells; the acute leaflets and smaller fruits distinguish it; the fruits when mature suggest those of *S. exarata*, in nervation of the cells.

Huánuco: Valley of the Monzón, 600 meters, *Weberbauer 3610; 3624;* 286. Cuchero and Chinchao, *Ruiz & Pavón*, type; *Dombey.* Ecuador; Venezuela.

Serjania rubicaulis [R. & P.] Benth. ex Radlk. Monogr. Serj. 254. 1875; 150.

Scandent, suffruticose, more or less aculeate, and pubescent or puberulent; branches canaliculately 5-sulcate, the ligneous structure simple; petioles emarginate or the intermediate ones slightly; leaves biternate, nearly glabrous except both sides punctiform-glandular, and slightly pubescent near the nerves beneath with crisp trichomes, membranous-subcoriaceous, reticulate-veined, greenish-brown, paler beneath, lacking mucus, pellucid-punctate and lineate; leaflets lanceolate-oblong, the lower lateral ovate, obtuse, the others acute both ends, sessile and with 1–3 (–5) large or small teeth near the tip on both edges, the somewhat larger terminal often 10–12 cm. long, 4–5 cm. wide, sometimes smaller, rarely much wider; panicles mostly paniculately racemose, crisply pubescent; flowers small or medium, the sepals all densely tomentulose, upper petal scales merely emarginate or calloused; fruit section cordate-ovate, abruptly narrowed, little if at all contracted below the ecristate cells, glabrous as also the endocarp, 1.5–2 cm. long, about 1–1.5 cm. wide, the seed medially affixed.—The species name was originally in Ruiz and Pavón's Journal under *Paullinia*.

Killip and Smith noted its use as a fish stupefier.

San Martín: Valley of the Río Mayo near Moyobamba, *Weberbauer 4532;* 289. Zepelacio, *Klug 3730* (det. Standley, *S. glabrata*). Tocache, *Ferreyra 4434; 4460.* Pongo de Cainarachi, *Klug 2613* (det. Standley). Juanjuí, *Ferreyra 4554.* Tarapoto, *Spruce 4139* (in part *S. glabrata*).—Huánuco: Near Pozuzo, *Ruiz & Pavón,* type. Woods, Pampayacu and Cuchero, *Poeppig.* Distrito Divisioria, *Woytkowski 34556* (det. Cuatrecasas). Churubamba, *Mexia 8120; 8205; 8215* (all det. Standley).—Junín: Río Paucartambo, Valley near Perené Bridge, *Killip & Smith 30682* (det. Killip); also *25401* in part (apparently in part *S. glabrata,* as det.).—Cuzco: Potrero, Dept. Convención 1,250 meters, *Vargas 2147* (distr. as *Paullinia* species).—Loreto: Wooded banks of Lower Río Huallaga, *Killip & Smith 29011* (det. Killip). Lorenzo, between Ríos Pastaza and Huallaga, *Dennis 29282* (det. Killip, *S. glabrata?*). Bolivia. "Verap" (Killip & Smith), "anti-Christo" (Mexia).

Serjania rufa Radlk. Monogr. Serj. 324. 1875; 204.

Reddish hirsutulous with mostly crisped or curved trichomes including the 6–8 angled-sulcate branches, the biternate leaves on both sides, especially on the nerves, the panicles even to the sepals

but there the indument more reduced and subtomentulose; petioles striate, emarginate or the intermediate in part margined; stipules small, lanceolate; terminal leaflet obovate-cuneate, 8 cm. long, half as wide, the smaller lateral rather obliquely oblong-elliptic, all sessile, abruptly and acutely acuminate, coarsely serrate from the middle, subcoriaceous, nitidulous above, opaque beneath, minutely pellucid-punctate, containing mucus; panicles solitary or panicled, often 1–1.5 dm. long, slender, the glomeruliform cincinni sessile, the basally articulate pedicels scarcely exceeding 1 mm.; inner sepals 2 mm. long, the third and fifth united nearly to the middle; petals 2–2.5 mm. long, 1 mm. wide, the upper scales obcordate, the lower aliform; ovary pilose.—Type in flower; fruit of *Killip & Smith 25063*, fruits 2 cm. wide, 2.5 cm. long, lightly pubescent especially toward the subglobose cells, their pericarp subindurate, those of my *5554* similar but as wide as long. F.M. Neg. 5580.

Mashed stems used to stupefy fish (Killip & Smith).

San Martín: Near Tarapoto, *Mathews 1321*, type; *Spruce 4559*.—Junín: On river bank brush near La Merced, *5554; Killip & Smith 23845* (det. Killip). Colonia Perené, *Killip & Smith 25063* (det. Killip). Pichis Trail, *Killip & Smith 25424* (det. Killip). Río Paucartambo Valley, *Killip & Smith 25376*. "Verap" (Killip & Smith).

Serjania sphaerococca Radlk. Monogr. Serj. 153. 1875; 96.

Allied to *S. caracasana* which it resembles except that the younger stems, as the rachises of the inflorescences, are at least moderately pubescent with sordid or yellowish crisp trichomes, the leaflets lanceolate and barbate in the axils of the nerves, the intermediate and lateral petioles usually margined; leaves often 16 cm. long, 12 cm. wide, the upper gradually smaller; petioles 4–9 cm. long, early hirtellous; leaflets narrowed both ends, equally crenate or subserrate, the slightly larger terminal one 7–9 cm. long, 2–2.5 cm. wide; panicles often congested at branchlet tips and much longer than the reduced leaves; pedicels 2.5 mm. long, in fruit to 4 mm.; inner sepals 4 mm. long; fruit 2.5–3 cm. long, about 2 cm. broad.—Illustrated, Mart. Fl. Bras. 13, pt. 3: *pl. 69*.

Huánuco: Chinchao, *Ruiz & Pavón*. Cuchero, *Poeppig*, addenda *49*.—San Martín: Juanjuí, *Klug 3800* (det. Standley, *S. leptocarpa?*). Tarapoto, *Spruce 4060*.—Junín: Along Río Perené near Colonia Perené, *Killip & Smith 25109* (det. Killip). La Merced, *Killip &*

Smith 23490?.—Ayacucho: Aína, *Killip & Smith 23099* (det. Killip). Bolivia.

Serjania squarrosa Radlk. Monogr. Serj. 115. 1875; 63.

Scandent shrub with rusty-red 5–6-angulate branches 2.5 mm. thick, the lateral lightly canaliculate, puberulent toward the tips; central ligneous area large with only 1 or 2 small peripheral ones; stipules lanceolate; petioles 1.5–2.5 cm. long, striate, narrowly canaliculate above; leaves subbipinnate, 8–9 cm. long, 5–6 cm. wide, the lower pinnae 5-foliolate-pinnate, the following ternate, the upper simple; terminal leaflet 2 cm. long, half as wide, the lateral half as large, all subtrinerved, subcoriaceous, paler beneath, the smaller ovate, cuneate at base, sessile, crenate or subserrate, scabrous above, below on nerves a few scattered long trichomes and barbate in the lower axils, epunctate or minutely and very obscurely punctate, the epidermis containing mucus; rachis margined above; panicles 7 or 8 cm. long, squarrosely spreading, about one-third floriferous, puberulent, the free sepals sordidly; bracts and bractlets subulate; flowers "rather large"; petals attenuate-obovate, glanduliferous within, flabellately nerved, the scales of the upper with deflexed appendage; stamens a little pilose; fruit cordate-ovate, 2 cm. long, as broad below, sometimes suborbicular, excised base and apex, the cells dorsally cristate, puberulent, the endocarp whitish villous.—Male flowers in type imperfect from fungus. Most of the following material was distributed as *S. platypetala* and some of it at least may belong there if that form is separable. F.M. Negs. 5979; 36051.

Apurímac: Abancay, 2,400 meters, *Vargas 943*.—Cuzco: Pachar, 2,900 meters, *Pennell 13688*. Huasao, Prov. Quispicanchi, *Herrera 687*. Ollantaitambo, *Cook & Gilbert 603* (det. Killip, *S. brachyptera*); *Pennell 13685; Cook & Gilbert 389; Herrera 849a*.—Puno: Ollachea, *Soukup 500*. Without locality, *Gay*, type. "Huecjucjilla," "bejuchilla" (both, Cook & Gilbert).

Serjania striata Radlk. Monogr. Serj. 280. 1875; 172.

Scandent shrub, glabrous except for some scattered trichomes on the imparipinnate leaves beneath on the nerves and at the margins, barbellate in the nerve axils, the tomentulose inner sepals and the apex of the young fruit; branches about 10-striate, 10-costate, the ligneous structure simple; petioles and leaf-rachises striate, emarginate, unless the lateral; stipules small, ovate; leaves 16 cm. long, 14 cm. wide, the ovate leaflets 5–7 cm. long, 3–4 cm.

wide, 3 pairs, the lower pinnae ternate, the next often tripartite, rarely subentire, the lower obtuse, the rest acute or caudate, the terminal leaflet often tripartite or pinnate, all dentate or nearly lobed, rather obovate and plicate, membranous, somewhat lustrous above, paler beneath, true pellucid-punctae lacking, epidermis lacking mucus; panicles solitary on stipes 5–10 mm. long, the 3–5 mm. long puberulent pedicels articulate below the middle; outer sepals glabrous, the inner 5 mm. long; petals 6 mm. long, 3 mm. wide, both the upper and lower scales bicruriate; fruit (young) oblong, the cells villous-tomentose with seed at base, the endocarp glabrous.—The Goodspeed collection matches the photograph but the leaflet divisions are smaller. F.M. Neg. 36052.

Apurímac: Río Pachachaca, 3–4 meters in shrubs, flowers waxy white, 2,000 meters, *Goodspeed Exped. 10521* (det. Standley).—Cuzco: *Gay*, type.

Serjania striolata Radlk. Bot. Jahrb. 37. 147. 1905; 170.

Like *S. oxyphylla* but the branches ashy-pubescent at tip, minutely puberulent between the costae, the leaves imparipinnate with 3–4 pairs, the lower pinnae mostly 5-foliate-pinnate, the next ternate, the upper simple, all multinerved, the nerves spreading; punctae not obvious; terminal leaflet acutely subulate-caudate, the lateral obtuse, all with 8–12 approximate nerves; panicles solitary, ashy-pubescent except the 1.5 mm. long pedicels that are articulate below the middle; sepals glabrous except ciliate-glandular; buds 1.5 mm. long, the opened flowers unknown.—It seems possible that this could be a vigorous state of *S. oxyphylla*. F.M. Neg. 5582.

Ancash: In wood near river, 2,200 meters, Huaráz, *Weberbauer 3031*, type; 172.

Serjania subrotundifolia Radlk. Monogr. Serj. Suppl. 118. 1886; 132.

Somewhat pubescent liana, the younger branches as the inflorescence reddish hirtellous, the older glabrate, 8-sulcate, 8-costate, the composite wood with as many peripheral areas; leaves biternate, the upper 15 cm. long, 12 cm. wide, membranous-coriaceous, lustrous both sides, brownish, containing mucus, pellucid-punctate, glabrous above, puberulent beneath, especially on the arcuate-ascending lateral nerves and at the margins; leaflets elliptic, the lower lateral subrotund, retuse and with apical callose on the lower side, subentire, attenuate or contracted at the subsessile base, the terminal 6.5 cm.

long, 3.5 cm. wide, the lateral 2.5 cm. long, hardly 2 cm. wide; petioles all emarginate; panicles congested, the cincinni stiped, the pedicels barely 2 mm. long; inner sepals less than 2.5 mm. long, tomentulose, the half as long outer ones also a little hirtellous; petals 2.5 mm. long, scarcely 1 mm. wide, the upper scale crest dilated, the lower dentiform; stamens villous, anthers glabrous as the rudimentary ovary.—The type number as in Kew is the same number (maybe the same species?) as the dubious collection of *S. membranacea.*

Puno: *Lechler 2331,* type (*2332* in herb. Kew).

Serjania sufferuginea [R. & P.] Radlk. Monogr. Serj. 299. 1875; 176.

Scandent shrub, the 6-striate subterete branches sufferrugineous-tomentose, about 3.5 mm. thick; ligneous structure composite, the small peripheral areas 3; stipules small, ovate; petioles all emarginate tomentose as the biternate leaves especially beneath, these 16 cm. long, 14 cm. wide, rather fleshy membranous, minutely pellucid with orbicular punctae, the epidermis lacking mucus; terminal leaflet 9 cm. long, 4.2 cm. wide, subrhombic-lanceolate, the elliptic-lanceolate lateral gradually reduced, all sessile or the terminal attenuate to short petiolule, crenate, acute; panicles solitary (perhaps not always), the peduncles 5-angled, the rachises terete, loosely and interruptedly cincinniferous, at least the lower branchlets verticillately congested on stipes about 12 mm. long, the upper with stipes 3–4 mm. long; pedicels 5 mm. long, articulate above the base, rusty-puberulent as all the sepals, the inner 4.5 mm. long; petals nearly 5 mm. long, about 2.5 mm. wide, the upper scales obcordate, the lower obliquely winged; young fruit subtruncate, tomentose and with some spreading reddish long trichomes, the endocarp floccose, the seed at the base of the cells.—Scrap of type at Chicago consists of the very young fruit; the closely hirsute cells would doubtless match later those of *S. mollis* as cited but type of that perhaps less hirsute. The herbarium name was the same at Madrid by Ruiz, under another genus. Here might be sought *S. rigida* Radlk. forma *hirta* Radlk., 176, of adjacent Bolivia, the flowering stems only 2 mm. thick, partial petioles margined, leaflets beneath and branchlets reddish hirsute-tomentose with crisped trichomes, epidermis containing mucus; there is a glabrous or nearly glabrous form; see under *S. inflata.*

Huánuco: Vitoc, *Ruiz & Pavón,* type. Bolivia.

Serjania tenuifolia Radlk. Monogr. Serj. 220. 1875; 132.

Essentially glabrous, indument when present a minute puberulence on the midnerve of the rather coarsely and somewhat double-serrate leaflets, especially above and in the inflorescences; wood composite, the peripheral columns suborbicular; branches about 8, sulcate-costate, not canaliculate, the flowering 3–5 mm. thick; leaves biternate, thin- or rather firm-membranous; darkening in herbaria, the ovate-elliptic or suboblong leaflets mostly lineately pellucid but also somewhat punctate, epidermis containing mucus; the basally attenuate terminal 10–15 cm. long, about half as wide, the lateral often only half as large, all acuminate or more usually obtuse and mucronate or barely acute; petioles emarginate; inflorescences mostly terminal, the cincinni sessile, scarcely crowded; pedicels slender to at least 3 mm. long; sepals all pulverulent, 2 mm. long; petals nearly 3 mm. long; fruit (half mature in type) ovate, glabrous including endocarp, style pilose, seed near base of cell, in Woytkowski specimen 2 cm. broad and long, little constricted at the obscurely veined subtrigonous cells.—Stem climbing about 6 meters, latex white, leaves thin, soft, the nerves paler, petals greenish-white (Woytkowski).

San Martín: Hera near Moyobamba, *Woytkowski 35313* (distr. as *S. brachyptera* Radlk.).—Junín: Thickets along Río Perené, *Killip & Smith 25138* (probably, but young; distr. as *S. inflata*).—Loreto: Yurimaguas, *Poeppig*, addenda *92*, type.

Serjania trirostris Radlk. Notizbl. Bot. Gart. Berlin 6: 149. 1914; 200.

Glabrate or lightly puberulent as the tips of the nearly terete striate branches; wood composite with 6 peripheral areas; stipules small, deltoid; petioles all emarginate, the common one 3–4 cm. long; leaves biternate, the terminal leaflet 9 cm. long, 4 cm. wide, all subsessile, ovate-oblong-lanceolate, remotely and obtusely dentate from the middle, subcoriaceous, glabrous above except the midnerve, very sparsely crisped puberulent beneath, olive-green, epunctate, the epidermis containing mucus; panicles dense, the short recurving cincinni subsessile, the fruiting pedicels only 3 mm. long, articulate below the middle; flowers white, 2 mm. long and broad, the sepals all puberulent, the inner 2 mm. long, the third and fifth connate below; upper scales with deflexed appendage, long-barbate, the lower corniform; fruit sparsely crisped pubescent, 2 cm. long, nearly as thick (doubtless larger at maturity) the cells dorsally produced into

erect-spreading beaks.—Resembles *S. deltoidea* with compoundly divided leaves (Radlkofer). F.M. Neg. 9560.

Ayacucho: Aína, *Killip & Smith 23099?*—Loreto: Yarinacocha on the Río Ucayali, *Tessmann 3311*, type; also *3311a*. Bolivia.

2. PAULLINIA L.

With the habit of *Serjania* but flowers usually larger, leaves often pinnately 5-foliolate and especially fruit a leathery 3-valved capsule, the often reddish or yellowish 1–3-seeded valves winged or ribbed, sometimes spiny. Flowers borne in axillary panicles that are often racemiform or spiciform. Sepals 5, 2 of the inner more or less united, imbricate. Petals 4, each with a crested hooded scale, the upper ones with a deflexed appendage, barbate below. Disk glands 4. Seeds more or less arillate.—Spruce noted the native names "Cupana," "guarana" and "timbo" for some Amazonian species.

P. yoco Schultes & Killip and *P. cupana* HBK. are noteworthy as containing enough caffein so that a stimulating beverage is made from them—as noted below—while several other species are of interest as serving the natives as fish stupefiers and one at least (*P. cururu* L.) is in some kinds of curare poison.

Fruits echinate except *P. neglecta;* leaves all quinate or ternate or rarely 5-foliolate in *P. neglecta.*

Leaflets all or in part entire; fruits spinose.

Leaves often quinate; stems yellow setulose.....*P. echinata.*

Leaves ternate and obscurely pubescent as the stems.*P. hystrix.*

Leaves ternate and glabrous as the stems.

Leaflets reticulate veined; fruit firm, densely echinate. *P. paullinioides.*

Leaflets subclathrate veined; fruit spongy, sparsely echinate. *P. Sprucei.*

Leaflets serrate toward tip; fruits smooth.....*P. neglecta.*

Fruits smooth, sometimes alate; leaves not simply quinate or ternate unless sometimes the uppermost ternate.

Fruits alate (known); leaflets (Peru) acute or acutely short-acuminate, unless *P. Killipii.*

Leaf rachis obviously margined, sometimes narrowly or the leaves pinnate unless in *P. enneaphylla.*

Leaves pinnate or lowest pair of leaflets ternate or pinnate.

Lower leaflets pinnate; plants setose-hispid.....*P. hispida.*
Lower leaflets often ternate.
Leaflets nearly linear, 4–9 mm. wide.....*P. linearis.*
Leaflets lanceolate or ovate, wider.
Leaves pinnate with narrow leaflets.
Stems setulose.....*P. tenera.*
Stems glabrous.....*P. fistulosa.*
Leaves biternate with rather ovate leaflets.
P. serjaniaefolia.
Leaves 5-foliolate.
Stipules conspicuous, persisting; leaflets if dentate not only at base.
Branches if setulose not angulately; wood simple.
Stems glabrous or minutely setulose.
Stipules often longer than 7 mm.; fruits obovate.
P. caloptera.
Stipules usually shorter than 6 mm.; fruits suborbicular.....*P. serjaniaefolia.*
Stems conspicuously setulose.....*P. setosa.*
Branches barbate on angles; wood composite.
P. trilatera.
Stipules minute.
Leaflets often 1–2 dentate near base.....*P. bidentata.*
Leaflets closely denticulate.....*P. enneaphylla.*
Leaf rachis emarginate (see *P. enneaphylla*).
Indument clearly hispid-setose, often dense on petioles and upper stems; panicles solitary.
Stipules fimbriate, conspicuous.....*P. fissistipula.*
Stipules entire.....*P. acutangula.*
Indument nearly lacking to pilose-tomentose.
Wood simple; panicles solitary or glomerate.
Panicles solitary (species ill-defined, may be ecotypes).
Stems lightly pubescent or glabrate.....*P. nobilis.*
Stems densely pubescent.
Leaves at maturity ample.....*P. gigantea.*
Leaves small, the leaflets less than 1 dm. long.
P. dasystachya.

Panicles glomerate in the leaf axils.

Leaves small, pilose beneath.....*P. martinensis.*

Leaves ample, glabrous.

Stipules conspicuous.....*P. Killipii.*

Stipules small, subulate.....*P. exalata.*

Wood composite; panicles unless uppermost openly fascicled.....*P. Alsmithii.*

Fruits exalate (known); leaflets often obtusely short-acuminate (merely apiculate in *P. subrotunda*), the rachis often distinctly wing-margined (in Peru) if leaflets notably acute.

Leaflets usually rounded or obtuse, often mucronate or callose or if acutish, petioles and rachis not wing-margined.

Leaf rachis as often petioles at least narrowly margined; wood simple unless in *P. pinnata;* panicles not glomerate.

Leaves subbiternate, the first pair of leaflets usually ternate.....*P. pachycarpa.*

Leaves 5-foliolate or imparipinnate and often 2–4 pairs.

Petioles emarginate; capsules subglobose.
P. sphaerocarpa.

Petioles at least narrowly margined.

Leaflets sharply dentate.....*P. Josecuatrii.*

Leaflets subentire or the teeth few, obtuse.

Leaves 5-foliolate; petioles margined.

Stipules minute.

Leaflets subentire; ovary as style puberulent.

Leaflets chartaceous, pale, subentire.*P. laeta.*

Leaflets rigid, drying dark, 1–2-dentate.
P. subauriculata.

Leaflets remotely dentate; ovary as style glabrous.....*P. pinnata.*

Stipules about 1 cm. long.....*P. simulans.*

Leaves usually with 2–4 pairs of leaflets; petioles broadly winged.

Ovary glabrous; leaflets 2 pairs.....*P. olivacea.*

Ovary tomentose; leaflets 3–4 pairs.*P. pterophylla.*

Leaf rachis as petioles emarginate; wood sometimes composite.

Stipules entire, often deciduous or inconspicuous.

Panicles solitary, sometimes disposed apically, elongate.

Leaf nerves subparallel, usually all less than 1 cm. distant, venation clathrate; ovary tomentose.

Leaflet acumen entire.....*P. elongata, P. faginea.*

Leaflet acumen bidenticulate, short..*P. subrotunda.*

Leaf nerves arcuate-spreading, variously distant.

Wood simple; plants often somewhat pubescent.

Leaflets consistently small, terminal rarely and little longer than 1 dm.; stems striate or costate; ovary tomentose (known).

Leaflets entire or subentire.

Stipules about 5 mm. long, persisting. *P. itayensis.*

Stipules minute, caducous.

Panicles at most about as long as leaves.

Leaflets entire unless 1–2 callose near base; panicle rachis nearly glabrous; leaflet acumen broad..*P. uchocacha.*

Leaflets subdenticulate toward tip; panicle rachis puberulent; leaflet acumen slender.....*P. curvicuspis.*

Panicles often exceeding leaves, mostly borne apically.....*P. capreolata.*

Leaflets coarsely dentate, usually to below the middle.

Leaflets firm; acumen obtuse.

Venation reticulate; panicle rachis to 1.5 mm. thick.....*P. sphaerocarpa.*

Venation clathrate; panicle rachis rather stout.....*P. obovata.*

Leaflets diaphanous in herb.; acumen acute. *P. tenuifolia.*

Leaflets consistently medium to large, lateral usually well exceeding 1 dm.; stems often sulcate; ovary or fruit glabrous.

Leaflets all long-cuneate to long petiolules. *P. cuneata.*

Leaflets not cuneate-based except terminal.

Venation clathrate.

Petals 2.3 mm. long.....*P. yoco.*

Petals 4 to nearly 5 mm. long..*P. cupana.*

Venation reticulate.

Stipules minute, caducous; stems striate-costate.

Ovary pubescent; petals 3 mm. long; acumen broad.....*P. tarapotensis.*

Ovary glabrous; petals 4 mm. long; acumen narrow.....*P. mazanensis.*

Stipules to 8 mm. long, persisting; stems angled, sulcate.

Flowers 3 mm. long, bracts minute; leaflets acuminate.....*P. simulans.*

Flowers 4.5 mm. long, bracts large; leaflets obtusish.....*P. Mariae.*

Wood composite; plants glabrous or nearly, leaflets medium size, reticulate; ovary glabrous.

Leaves 5-foliolate, pellucid lineolate...*P. spicata.*

Leaves usually ternate in part, obscurely pellucid. *P. neglecta.*

Panicles glomerate, stout; ovary pubescent.

Leaflets glabrous, ample; wood composite..*P. exalata.*

Leaflets pubescent, medium; wood simple. *P. martinensis.*

Stipules stellately incised, persisting.

Stems short-hirtellous.....*P. rugosa.*

Stems long-hispid.....*P. fissistipula.*

Leaflets acute or acutely acuminate and petioles or rachis wing-margined (*P. alata* sometimes apiculate or obtusish).

Panicles solitary.

Panicles rather robust, the rachis several mm. thick; leaflets about elliptic.

Leaves pilose beneath; fruits tomentose; wood composite. *P. eriocarpa.*

Leaves subglabrous even beneath; fruits glabrous; wood simple.....*P. imberbis.*

Panicles slender, rachis to 1.5 mm. thick; leaflets oblong-lanceolate; wood composite.....*P. pinnata.*
Panicles glomerate on stems or branches; wood composite.
P. rhizantha, P. alata.

Paullinia acutangula (R. & P.) Pers. Syn. Pl. 1: 443. 1805; 324. *Semarillaria acutangula* R. & P. Prodr. 54. 1794. *P. lactescens* Poepp. & Endl. Nov. Gen. & Sp. 3: 37. 1844.

High-climbing with 4–5-angled and thus 4–5-sulcate branches sordidly or yellowish hirsute-hispid especially on the angles; wood simple; stipules lanceolate-subulate, about 1.5 cm. long, 3 mm. wide at base, hirsute beneath, glabrous above as the 5-foliolate-pinnate leaves; petioles 4–8 cm. long, hirsute, more or less 3–4-angled but emarginate as also the somewhat shorter rachis, both pilose-hirsute; leaflets 10–15 (20) cm. long, 3–7 (9) cm. wide, or the terminal a little larger and cuneate at base, the upper lateral broadly acute, the lower rounded, all subsessile, oblong-elliptic-lanceolate to rather broadly elliptic-obovate, cuspidate-acuminate, above the middle remotely serrate-dentate, the teeth mostly mucronulate, membranous, somewhat hispidulous beneath especially on nerves and veins, above punctate-pellucid, lacking mucus; panicles solitary, hirsute, the many-flowered cincinni stiped, the pedicels very short; inner sepals about 4 mm. long, glabrous, the outer puberulent; petals obovate; ovary hirsute; capsule obcordate-subrhomboid, shortly stiped, 2 cm. long, half as wide, hirsute within and without, the wings abruptly attenuate above the middle, the seeds apparently glabrous.—Leaflet acumination in type to 12 mm. long, very acute. Stems about 5 cm. thick, lactescent, the cinnamon-colored bark rigid-hirsute (Poeppig). F.M. Neg. 23639.

Huánuco: Muña, *Ruiz & Pavón*, type. In woods at Pampayacu, *Poeppig 1758* (type, *P. lactescens*).—San Martín: San Roque, *Williams 7474*.—Junín: Cahuapanas on Río Pichis, *Killip & Smith 26760* (det. Standley, *P. nobilis*).—Loreto: Yurimaguas to Balsapuerto, *Killip & Smith 28259* (det. Killip); *29050; 28662*. Bolivia.

Paullinia alata (R. & P.) G. Don, Gen. Syst. 1: 660. 1831; 242. *Semarillaria alata* R. & P. Fl. Peruv. 4: *pl. 340*. 1802.

Younger scandent branches triangular, more or less 6-costate and sparsely crisped puberulent, the older soon twice as thick (6–8 mm.) or larger and 3-sulcate; wood composite with 3 peripheral areas; stipules 4 mm. long, lanceolate-subulate; petioles and leaf-rachises winged, the former 4–6 cm. long, the latter 2–3 cm. long, the wings

each side 1.5–2.5 (–5) mm. wide, petiolules scarcely 2 mm. long, leaves 5-foliolate-pinnate, the leaflets in type oblong-lanceolate but apparently often broadly elliptic in variants, remotely dentate (Peruvian) terminal 8–13 cm. × 3–5 cm., rest smaller or subentire, membranous, nitidulous both sides, above on nerves, all over beneath sparsely pubescent (rarely rather densely) and in the nerve axils pilose, in type glabrescent in age, microscopically glandular and subpellucid-lineolate, the epidermis lacking mucus but lower sides sparsely crystallophorous; panicles 1.5–2 cm. long, appressed yellowish-puberulent, borne on the branches, often fasciculate-glomerate, the lower cincinni stiped, the upper sessile, the pedicels 3–4 mm. long, articulate above the middle; flowers 3.5 mm. long; 2 outer sepals less than half as long as the subglabrous inner, rotund ovate, appressed puberulent; upper petals obovate-oblong, much longer clawed than the lower oblong ones; ovary yellowish pilose; capsule apparently subglobose, in var. *loretana* obovoid, about 2 cm. long, shortly stiped, sparsely puberulent, the seeds medially arillate. —See also *P. rhizantha* which may be distinct, the type of *P. alata* having lanceolate leaflets. Stems to 6 meters tall and 2 cm. in diameter; red fruit valves with black lustrous white-arilled seed (Stork, Horton & Vargas).

All of the material from Loreto has much larger leaves but apparently is not otherwise different; it may represent *P. rhizantha* but I hesitate to use that name as the description does not quite accord and some specimens approach the typical form; for convenience this then may be designated *P. alata*, var. **loretana** Macbr., var. nov., foliolis late ellipticis vel paullo obovatis interdum fere 1.5 dm. longis, 6–8 cm. latis. More distinctive is a collection that is softly pubescent and may prove to be distinct but in the absence of fruit may be treated as var. **pubens** Macbr., var. nov., ramulis foliisque praecipue subtus molliter pubescentibus cum pilis flavis; foliolis late ellipticis vel subobovatis 5–8 cm. latis, 10–12 cm. longis, solum mucronato-apiculatis. *P. largifolia* Radlk., 241, and *P. densiflora* Smith, 241, of the Amazon and Colombia respectively, have ternate leaves, the former with the panicles at defoliate nodes, the latter in the axils of young leaves. *P. fasciculata* Radlk., 242, is more like *P. alata* var. *loretana* but has lustrous membranous nearly glabrous leaves.

According to Kanehira used as a fish poison.

San Martín: Tarapoto, *Williams 6092*. Tingo María, *Allard 20513*.—Huánuco: Chicoplaya, *Ruiz & Pavón*, type. Pampayacu,

Kanehira 46. Prov. Huamalíes, *Stork & Horton 9564* type, var. *pubens*. Zepelacio, *Klug 3263* (more pilose).—Loreto: Caballo-Cocha, *Williams 2339*, type, var. *loretana*. Balsapuerto, *Klug 2879* (det. Standley). Iquitos, *Killip & Smith 27421*. Yurimaguas, *Williams 4317*. Florida, *Klug 1993*.—Cuzco: Deep woods, Echarate, *Goodspeed Exped. 10454* (det. Standley). Brazil to Panama. "Macote" (Kanehira).

Paullinia Alsmithii Macbr., sp. nov.

Scandens fruticosa; ramis valde sulcato-costatis ramulis petiolis paniculisque crispe pulverulento-strigillosis floriferis circa 7 mm. crassis (corpus lignosum compositum); stipulis subulatis 6–10 mm. longis, 0.5–1 mm. latis; petiolis costato-striatis et rhachis emarginatis, petiolulis 5–10 mm. longis; foliolis 5 late oblongo- vel ovato-ellipticis basi plus minusve inequaliter rotundatis, apice breviter subacute acuminatis plerumque 8–15 cm. longis, 4–7.5 cm. latis chartaceis pellucido-punctatis-lineolatis remote repando-denticulatis subclathrato-reticulato-venosis supra glabris subtus molliter puberulo-pilosis; paniculis racemiformis 4–7 cm. longis 1–5 in axillis foliorum sessilibus vel superioribus interdum longe pedunculatis; bracteis et bracteolis minutis; cincinnis breviter stipitatis remotis; pedicellis 3–5 mm. longis basi articulatis; sepalis subglabris interioribus circa 4 mm. longis; petalis oblongo-ellipticis; capsulis subrotundatis trialatis circa 1.5 cm. longis et latis glabratis, abrupte plus minusve stipitatis.—Seems to be well-marked, possibly related to *P. nobilis*.

Loreto: Iquitos, *Killip & Smith 26939*, type; *27170; 27290; 27204*.

Paullinia bidentata Radlk. Monogr. Paull. 195. 1895; 276.

Nearly glabrous (but inflorescence unknown) scandent shrub with terete branches, the wood simple; stipules minute, deltoid, axillary, geminate, pilose as margined petioles; somewhat winged leaf rachises, each about 3 cm. long, the 5-foliolate-pinnate leaves as broad as long, about 18 cm., the upper leaflets 11–12 cm. long, 3 cm. wide, the lower 8 cm. long, 2.5 cm. wide, all lanceolate, gradually acuminate, the upper acute at base, sessile, the lower subtruncate, subauriculate-bidentate, shortly petioled, pinnate-nerved, the nerves arcuate-ascending, reticulate-veined, membranous, sparsely barbate in the nerve axils, epunctate, containing mucus.—Placed by the author with *P. subauriculata*. F.M. Neg. 31037.

Cajamarca: Tambillo, *Jelski 412*, type.

Paullinia caloptera Radlk. in Engl. & Prantl, Pflanzenfam. 3, 5: 304. 1895; 329. *P. Williamsi* Macbr. Field Mus. Bot. 11: 27. 1931.

Scandent, subglabrous, the branches triangular, the leaves 5-foliolate-pinnate with 4-sulcate or somewhat margined petioles 2–5 cm. long, the prominent linear-lanceolate acuminate stipules 7–17 mm. long; rachis often conspicuously winged, 5 mm. wide, the sparsely pulverulent and ciliolate-hirsutulous leaflets ovate-lanceolate, subsessile or shortly petioled, acutely acuminate, nearly entire or remotely 3–5-dentate especially toward the tip, laxly reticulate, dull both sides, minutely punctate beneath, 3–3.5 cm. wide, 8–10 cm. long; inflorescence solitary, 2–3 cm. long, softly puberulent, the very short ramuli only 3–5-flowered; sepals minutely pulverulent, the outer 1.5, inner 3 mm. long; petals pilose at base.—With the appearance of *P. laeta* and *P. subauriculata* but the leaflets acutish-acuminate, the stipules large, the stems trigonous. The Peruvian plant is slightly more puberulent than the typical form from Brazil and Venezuela and when fruits are known may prove to be distinguishable at least varietally. *P. emetica* Schultes, Caldasia 2: 420. 1944, of southeastern Colombia has thin-membranous leaves and erect lax inflorescences to 2 dm. long; an infusion of the leaves is known to have been used as an emetic. Illustrated, Mart. Fl. Bras. 13, pt. 3: *pl. 89.*

Loreto: Río Nanay, *Williams 1196* (type, *P. Williamsi*). Mishuyacu, *Klug 913; 1453.* Timbuchi, Río Nanay, *Williams 982.* Venezuela; Amazonian Brazil. "Sapu-wasca" (*Williams*).

Paullinia capreolata (Aublet) Radlk. Monogr. Serj. 70. 1875; 300. *Enourea capreolata* Aublet, Pl. Guian. 1: 587. *pl. 235.* 1775.

Liana, essentially glabrous except for the puberulent younger branches, these terete, lenticellate, soon 3–4 mm. thick, and the solitary or sometimes paniculate panicles, these 1.5–2.5 dm. long, slender, (rachis 1–2 mm. thick), laxly flowered, the cincinni sessile or shortly stiped; wood simple; petioles and rachis emarginate; leaves pinnately 5-foliolate, the upper leaflets elliptic or elliptic-lanceolate, the lower ovate, all subentire or rarely denticulate apically, often undulate, shortly petiolulate or subsessile, 5–10 cm. long, obtusely acuminate, rounded or acutish at base or the terminal basally acute, lustrous both sides, micro-glandular, epidermis containing mucus, laxly transversely veined, few-nerved, chartaceous or subcoriaceous; bracts and bractlets minute, the pedicels about 2 mm.

long, articulate medially; outer sepals scarcely a third as long as the more or less connate subpetaloid inner, these 2.5 mm. long, all ashy-tomentulose without; petals oval-obovate, the scales more or less barbate including the bifid appendage; filaments complanate, densely reddish-long pilose, the anthers glabrous; capsules depressed globose, subsessile, glabrate without, lanate within, about 1.5 cm. long, nearly 2 cm. broad; seed surrounded by the fleshy farinaceous aril.—The branchlets of the Loreto specimens are notably lenticellate; the minutely and sparsely puberulent subglobose fruits are about 12 mm. in diameter, stipes 3 mm. long, pedicels 4 mm. long. *P. firma* Radlk., 299, is similar but the leaves are rigid coriaceous.

Loreto: Mishuyacu, *Klug 695; 759; 870.* Florida, *Klug 1979* (det. Standley). Ucayali, *Tessmann 4162.* To Venezuela and British Guiana. "Tingui" (Amazonian), "enourou" (Guiana).

Paullinia cuneata Radlk. Notizbl. Bot. Gart. Berlin 6: 150. 1914; 281.

Nearly glabrous, suffrutescent, the younger branches sulcate, sparsely puberulent, the wood simple, the leaves 5-foliolate-pinnate; stipules linear, lightly pilose, to 15 mm. long; petioles as rachis emarginate, the former a dm. long or longer, the lower leaflets with petiolules to 14 mm. long, the upper subsessile, obovate-cuneate, 10 cm. long or longer, 7–9 cm. wide, very shortly obtuse-acuminate, remotely subrepand-dentate from the middle, the short teeth spreading, nerves obliquely erect, prominent both sides, lustrous, glabrous, epunctate; panicles solitary, dense, sessile; bracts subulate, 2 mm. long; outer sepals minutely puberulent, the broadly obovate inner 2 mm. long, glandular-ciliolate, otherwise glabrous; petals oblong, 2.5 mm. long, the scales with puberulent deflexed appendage. —Similar to *P. cupana* HBK., 281, scandent or suberect shrub of Venezuela and Amazonian Brazil—possibly also Peru—source of "Guarana" but that with lateral leaflets ovate, rounded at base, scabrous-glandular beneath, sepals sparsely setulose-pilose.—Type from Cobijn, Bolivia (*Ule 9571*) near Madre de Dios.

Peru (no doubt; cf. note above). Bolivia; Brazil?

Paullinia cupana HBK. Nov. Gen. & Sp. 5: 117. 1821; 281.

Scandent or suberect liana, the apically brownish-pilose branches soon glabrous and deeply 4–5 sulcate, the flowering 4–8 mm. thick, the wood simple; stipules 2–3 mm. long, petioles and rachis emarginate, canaliculate above, convex and lightly striate beneath;

leaflets 5, the upper oblong, the lower ovate, the short acumen more or less obtuse, the terminal leaflet acute or subcuneate at base, the lateral rounded or more or less petiolulate and remotely subrepand-dentate, the dentations sometimes obscure, mostly prominent and obtuse, usually 1–2 dm. long, 4.5 to 9 cm. wide, coriaceous, obscurely clathrate-veined, glabrate both sides, obsoletely pellucid-punctate, epidermis lacking mucus; panicles solitary, sessile or peduncled, the subvillous rachis about 2 mm. thick, the rather remote cincinni sessile, few-flowered; bracts subulate, 1–1.5 mm. long, pedicels articulate below the middle, 4–5 mm. long; inner sepals 3 mm. long, submembranous, all laxly hirsutulous, free; petals oblong, 5 mm. long; filaments pilose, anthers glabrous; ovary glabrous, stiped, ellipsoid as the apiculate capsule, this brownish-tomentose within, 2–3.5 cm. long, deep red at maturity, the stipe finally 6–8 mm. long, seed about 12 mm. long, glabrous.—Var. *sorbilis* (Mart.) Ducke, Rodriguesia 3: 155–156. 1937 and Archiv. Inst. Biol. Veg. Rio Jan. 4: 47. 1938, differs in having tendrils, especially in the inflorescence, often subentire leaflets, slightly smaller flowers, much smaller fruits, these ovoid or spheroid, 15–18 mm. long, brilliant red, lustrous (Ducke). Here may be mentioned *Mexia 6297* with fusiform ellipsoid fruits about 3 cm. long, leaflets remotely dentate, 1–1.5 dm. long, referred to *P. tarapotensis* by Standley but with the venation of *P. cupana:* it may not be related here but the native names "Ycanchem" (Huitoto) and "lucumia" may be recorded. Illustrated, Radlkofer, l.c. 282; Ducke, Rodriguesia l.c.

The seeds of *P. cupana* and var. *sorbilis* are pulverized and mixed with cassava flour (*Manihot esculenta* Crantz) and formed into molds which are known as "pasta guarana" and dissolved as desired in hot or cold water; the caffein content of the "pasta" is three to six per cent, tannin two to three per cent so the beverage is astringent (Schultes). Cf. Radlkofer l.c. for bibliography pertaining to medicinal use.

Peru (possibly, see note above). Colombia to Venezuela and Amazonian Brazil. "Cupana," "guarana."

Paullinia curvicuspis Radlk. Monogr. Paull. 237. 1895; 301.

Branches terete, substriate, sordidly pulverulent, finally subglabrous, the wood simple, the leaves 5-foliolate-pinnate; petioles and rachises emarginate, the former 3–6 cm. long, the petiolules 2–5 mm. long; leaflets 5–10 cm. long, elliptic-lanceolate, with narrow, elongate, obtusish curved acumen, the terminal cuneate at base,

the lateral subacute, all remotely denticulate above the middle, petiolulate, few-nerved, narrowly transversely veined, subchartaceous, nitidulous and glabrous both sides but often barbulate in the nerve axils beneath, microscopically glandular, containing mucus; panicles solitary, the remote cincinni shortly stiped or subsessile, the pedicels 2 mm. long, medially articulate; flowers medium in size, all sepals canescent puberulent without; scales villous, the upper bifid; filaments with some long reddish trichomes; otherwise known.

Puno: San Govân, (*Lechler 2358*, type; *3277*).

Paullinia dasystachya Radlk. Monogr. Paull. 270. 1895; 325.

Closely allied to and apparently not specifically distinct from *P. gigantea* but the pubescence hirsute-tomentose; petioles 2–6 cm. long, tomentose; leaflets 5–8 cm. long, 2–3.5 cm. wide, ovate-oblong, acute or acutish, chartaceous, sparsely and minutely pubescent above, slightly pellucid punctate-lineolate, coarsely serrate-dentate, the few teeth obtuse; panicles yellowish-tomentose, cincinni long-stiped, the fruiting pedicels about 4 mm. long, articulate at base: sepals tomentose; capsule 3-winged, emarginate, the stipe about 3 mm. long, hirtellous-tomentulose without, pilose within, the seeds lightly pilose.—*Mexia 6773* from near Guayaquil, determined as *P. quitensis* Radlk. 325, is probably better placed here. It is another segregate, similar in pubescence but ovate leaflets remotely or obsoletely dentate, epunctate, the tomentose capsule truncate on stipe 1 cm. long.

Loreto: Florida, Río Putumayo, *Klug 2091; 2186?* (det. Standley, *P. coloptera*). Iquitos, *Killip & Smith 27131*. Pebas, *Williams 1843*. Bolivia; Ecuador.

Paullinia echinata Huber, Bol. Mus. Goeldi 4: 582. Aug. 1905; 303. *P. echinata* Radlk. Bot. Jahrb. 37: 153. Sept. 1905.

More or less reddish setulose high climbing liana, the pubescence extending to the petioles, leaves both sides, especially on the nerves and subclathrate veins, and the 3–5 fasciculately aggregate panicles that are borne on the older branches; petioles 1–2 dm. long, subterete, the sulcate petiolules 1.5–2.5 cm. long; leaves ternate or quinate, the obovate leaflets shortly and narrowly acuminate, 15–25 cm. long, 6–10 cm. wide, entire or appearing repand when unequally revolute, rigid-coriaceous, in age merely somewhat scabrous above, nitidulous both sides, containing mucus; panicles 1–2 dm. long, the sessile cincinni 4–6-flowered, the pedicels medially articulate, 3 mm. long,

8 in fruit; sepals tomentulose, the inner 4.5 mm. long; petals obovate oval, glandular both sides; filaments rufous villous; capsule ellipsoid-globose, on stipe 5–7 mm. long, densely echinate and setulose, the spines rather rigid, about 4 mm. long.—Flowers pale rose (Ule). F.M. Neg. 5597.

Loreto: Cerro de Canchahuaya, common in woods, on the Ucayali, *Huber 1441*, type. Yurimaguas, *Ule 6865; Kuhlmann 20931; Williams 3992; 4952.* Puerto Arturo, *Killip & Smith 27880.* Brazil.

Paullinia elongata Radlk. Monogr. Paull. 238. 1895; 302.

Scandent terete striate branches yellowish-tomentulose with a hirtellous indument; wood simple; stipules conspicuous, elliptic-lanceolate, coriaceous, tomentose both sides, about 5 mm. long; petioles and rachises emarginate, the former 5–8 cm. long, the petiolules 1–2 mm. long; leaves 5-foliolate-pinnate, the leaflets elliptic, obtusely acuminate, the terminal cuneate at base, the others acute, 7–10 cm. long, about half as wide, all coarsely serrate-dentate, coriaceous-chartaceous, clathrate-venose, glabrous above except for the puberulent midnerve, yellowish puberulent-pubescent, especially nerves, and microscopically glandular beneath, epidermis containing mucus; panicles solitary, the bracts about 2 mm. long, the cincinni sessile; pedicels 2 mm. long; sepals tomentulose, the inner nearly 4 mm. long; petals oblong; scales villous, the upper bifid with deflexed appendage; filaments whitish pilose.—This collection only in flower was placed by the monographer with *P. clathrata* Radlk., 302, of the Río Negro, with subentire leaflets, the pubescence less hirtellous, both forms in contrast to the "glabrous crenate-dentate" leaflets of *P. faginea* which compare; from material that has accumulated it is not clear that these differences are not highly variable. F.M. Neg. 23643.

Huánuco: Vitoc, *Ruiz & Pavón*, type.

Paullinia enneaphylla (R. & P.) G. Don, Gen. Syst. 1: 662. 1831; 330. *Semarillaria enneaphylla* R. & P. Fl. Peruv. 4: *pl. 341.* 1802.

Obsoletely lenticellate scandent striate subterete branches puberulent, finally glabrescent; wood simple; stipules small, deltoid; petioles and rachis scarcely if at all margined, both about 3–4 cm. long; leaves biternate, the leaflets elliptic-lanceolate, acute both ends (terminal, acuminate), 5–9 cm. long, 2–4 cm. wide, subsessile, rather

densely serrate-dentate, chartaceous, glabrous above, barbate in the nerve axils beneath, pellucid-punctate, lacking mucus; panicles solitary, puberulent, the cincinni in flower subsessile, in fruit on stipes 3–4 mm. long, the pedicels 1–2 mm. long, articulate at base; flowers pubescent, whitish, the oval inner sepals 3 mm. long, all sparsely glandular-ciliolate; petals obovate-oblong; ovary appressed tomentose; capsule 3-winged, obcordate, apiculate, about 1.5 cm. long, 1.8 cm. wide, glabrous without, puberulent within, the globose-obovoid seeds glabrous, arillate nearly to the middle.—Capsule sessile, that is estipitate, in contrast to that of the more northern *P. fuscesens* HBK., 330, and *P. navicularis* Radlk., 335, both perhaps variants found as near as Ecuador; both are more pubescent, containing mucus, the leaf rachis more or less margined, barely in the latter, the capsule stipe of the former short, of the latter 3 mm. long. F.M. Neg. 29690.

Huánuco: Chinchao, *Ruiz & Pavón*, type.—Cajamarca: Between Huambos and Montán, 2,500 meters, *Weberbauer 4214*.

Paullinia eriocarpa Tr. & Planch. Ann. Sci. Nat. sér. 4. 18: 353. 1862; 265. *P. eriantha* Benth. ex Radlk. Monogr. Serj. 75. 1875.

Scandent branches glabrate to hirsute, 4–5-angulate-sulcate, the wood composite, the peripheral areas 2 or 3; stipules appressed pilose, about 8 mm. long, 3–5 mm. wide; petioles 2–5 cm. long, the rachises shorter, both with wing-margins 4–6 mm. wide; leaves 5-foliolate-pinnate, sometimes ternate, the leaflets 5–15 (20) cm. long, 2.5–6 (9) cm. wide, elliptic-lanceolate, upper cuneate at base, lower acutish, all acuminate, remotely repand-dentate above the middle, shortly petiolulate or subsessile, subcoriaceous, typically glabrous or often densely pilose beneath, lacking mucus but sparsely crystallophorous; panicles solitary with short even headlike flowering portion only 2–4 cm. long, the bracts unusually broad, scariose, 7 mm. long, nearly as wide, sericeous beneath; cincinni sessile, the flowers subsessile with sericeous sepals, the broadly ovate inner 7–8 mm. long, 5–6 mm. wide; petals tomentulose below, sepaloid, 8–9 mm. long, 3–5 mm. wide; capsule ligneous, about 2.5 (3) cm. long, 1.7 cm. wide, ovoid, shortly acuminate, yellowish-tomentose, the long-arillate seed lanate.—The more northern and eastern ranging *P. leiocarpa* Griseb., 264, has leaves merely barbate in the nerve axils and subulate bracts; the southeastern Colombian *P. splendida* Schultes, Caldasia 2: 421. 1944, said by author to belong to section *Pleurotechus* Radlk. but apparently comparable to *P.*

eriocarpa, has bracts about 2 mm. long and broad, papyraceous leaflets to 2 dm. long; *Killip & Smith 29471* from Río Itaya might be referable to it. F.M. Neg. 5598.

San Martín: Tarapoto, *Spruce 4415* (type, *P. eriantha*); *Williams 5849; 6770.*—Loreto: Yurimaguas, *Williams 4302*. To Panama.

Paullinia exalata Radlk. Bot. Jahrb. 37: 150. 1905; 244.

Glabrous liana even to the sepals or a few trichomes in the axils of the nerves on the 5-foliolate-pinnate leaves beneath; older stem 3-angled, enlarged at the cirrose nodes, the triangular canaliculate branches 6-costate; wood composite with 3 peripheral areas; stipules subulate, 3 mm. long; petioles and leaf-rachises not winged, the former 6–16 cm. long, the latter 4–6 cm. long, the terminal leaflet with petiolule 1 cm. long, 16–18 cm. long, the elliptic-ovate shortly acuminate lateral leaflets little smaller, all obtusely and remotely subrepand-dentate, chartaceo-subcoriaceous, opaque both sides, lateral nerves prominent beneath, lacking mucus; panicles glomerate on older stems, 2–3 cm. long, puberulent, the lower cincinni shortly stiped, the pedicels 5–6 (–8 in fruit) mm. long, articulate above the middle; flowers 5 mm. long, nearly glabrous except for the appressed pilose ovary, the outer sepals with a few trichomes, the inner glabrous, 5 mm. long; petals 5.5 mm. long, the upper scales barbate and parted, the lower bifid and aliform; ovary pilose; capsule glabrate, 3 cm. long, the seed part 1.5 cm. long and wide, the valves little enlarged, the lustrous seeds 1.5 cm. long. F.M. Neg. 5599.

Junín: La Merced, 1,000 meters, *Weberbauer 1910;* 282. Brazil.

Paullinia faginea (Tr. & Planch.) Radlk. Monogr. Serj. 76. 1875; 301. *Enourea faginea* Tr. & Planch., Ann. Sci. Nat. sér. 4. 18: 379. 1862.

Similar to *P. elongata* especially to the var. *pubescens* Cuatr. of Colombia but typically less pubescent; flowering branches terete, reddish-puberulent, 3–4 mm. thick; wood simple; petioles and rachis emarginate; leaflets 5, oval, obtusely acuminate, the terminal acute at base, the lateral acutish or subrounded, all with petiolules 2–4 mm. long, remotely crenate-dentate above the middle, to about 12 cm. long, 5 cm. wide, chartaceous or submembranous, multinerved, narrowly and obliquely clathrate veined, glabrous or the midnerve above and the nerves beneath somewhat puberulent and barbate in the nerve axils, epidermis containing mucus; panicles solitary or paniculate, the upper much exceeding the leaves, shortly peduncled;

rachis about 2 mm. thick, puberulent-tomentulose, laxly flowered, the sessile cincinni contracted, the pedicels only about 1 mm. long; inner sepals 3 mm. long, tomentulose, subpetaloid; petals oblong; filament trichomes yellowish; ovary globose, sessile, reddish-tomentose.—*P. clathrata* Radlk., 302, seems to be a form with more broadly elliptic leaflets, the dentations less pronounced, and may be represented by *Klug 2001*. F.M. Neg. 23644.

Loreto: Río Mazán, *José Schunke 37* (det. Standley). Florida, Río Putumayo, *Klug 2001* (det. Killip); *Klug 2323*. To Colombia and Amazonian Brazil.

Paullinia fissistipula Macbr., sp. nov.

Scandens fruticosa; ramis thyrsigeris fere teretibus leviter costatis 1 cm. crassis utrinque sed praecipue in costis cum petiolis rhachisque emarginatis pedunculisque 3.5–15 cm. longis conspicue cum pilis rufis ad 2.5 mm. longis setoso-hispidis; corpus lignosum simplex; stipulis subrotundatis ad medium stellato-incisis adpresse hirsutis 2–2.5 cm. longis; petiolis striatis, petiolulis 2 mm. longis; foliolis 5 late ellipticis vel interdum paullo obovatis breviter acuteque acuminatis 12-15 cm. longis, 6–8 cm. latis, ad apicem repando-dentatis (dentibus nervo excurrente calloso-apiculatis glabris) subcoriaceis pellucido-punctatis tenuiter clathrato-reticulato-venosis supra (nerviis 12–15 approximatis exceptis) glabris, subtus sparse setulosis; paniculis densifloris circa 1 dm. longis, 2 cm. latis; bracteis ubique adpresse pilosis oblongo-acuminatis ad 1 cm. longis; pedicellis ad 8 mm. longis supra mediam articulatis; sepalis adpresse cinereo-pilosis interioribus circa 3.5 mm. longis; petalis circa 4 mm. longis; ovario rufo-hirsuto.—Suggests the Brazilian or Amazonian *P. rubiginosa* Camb., 266, and *P. stipularis* Benth., 267, both with oblongish leaflets and linear-subulate bracts, but probably is related to *P. fimbriata* Radlk., 288, of Central America with much shorter denser indument, larger flowers.

Loreto: Balsapuerto, *Klug 3056*, type (det. Standley, cf. *P. gigantea*).

Paullinia fistulosa Radlk. Monogr. Paull. 259. 1895; 319.

Completely glabrous even the short glomerate panicles borne at the defoliate nodes of the older branches, these scandent, 5-angled to subterete, and somewhat fistulose by the enlarged medular cavities, the wood simple; stipules linear-lanceolate, falcately recurving, nearly 1 cm. long; petioles all emarginate, the common

7–10 cm. long, sulcate, costate-striate, the lateral 1.5–2 cm., the rachis-segments marginate-winged above, 2.5–6 cm. long; leaves imparipinnate, the lower of the 3–5 pairs of lanceolate long-acuminate leaflets ternate, the terminal leaflet attenuate at base, the lateral acutish, sessile, all entire or with a more or less prominent tooth on each edge near the base, membranous, lacking mucus, 8–12 cm. long, 2.5–3 cm. wide; panicles 1–1.5 cm. long, the fruiting pedicels about 3 mm. long; inner sepals 3.5 mm. long; capsules obovoid, conspicuously attenuate into stipe 5 mm. long, the wings above 2–3 mm. wide, glabrous without, pubescent within, the somewhat pilose seed one-third arillate.—*P. medullosa* Radlk., 319, of Brazil, the leaflets somewhat acuminate, the lateral petioles marginate-winged above, is probably a variant. F.M. Neg. 36026.

Loreto: Mission de Sarayacu, *Castelnau*, type.

Paullinia gigantea Poepp. & Endl. Nov. Gen. & Sp. 3: 37. 1844; 324. *P. quitensis* Radlk. Monogr. Paull. 269. 1895, at least as to Peru.

Resembles the related *P. acutangula* but more robust; stipules scarious, gradually subulate-acute from the base, about 3 cm. long, nearly a third as wide; petioles 15–25 cm. long, subterete; leaflets 15–30 cm. long, 10–18 cm. wide, or apparently on newer branchlets often only a dm. long, less than half as wide, elliptic or the lower broadly ovate, the lateral rounded at base, all remotely repand-dentate or sometimes subentire, sessile or shortly petiolulate, chartaceous, clathrate-venose, typically epunctate; cincinni sessile or shortly stiped, in type few-flowered, the pedicels 4–5 mm. long; inner sepals about 4 mm. long, tomentulose without; petals oblong-elliptic; capsule said to be subglobose with short wings, hirsute.—As interpreted here the cited material includes plants showing considerable variation in degree of pubescence—nearly glabrous to shortly hirsute-tomentose—shape and size of leaves; this varies, it seems, even on the same plant. The capsules, as seen on a few of the collections, are puberulent-hirsutulous, wings narrowed to attenuate more or less stipitate base, narrower than capsule, to 3 cm. long, 2–2.5 cm. wide including wings. The Schunke specimen shows leaves from near top of stem and from below; the former are only a third as large; the stipules also run from lanceolate-subulate, 1 cm. long, to ovate-lanceolate, 2.5 cm. long, nearly 1 cm. wide. See *P. nobilis*, apparently a less pubescent state, and *P. dasystachya*, a tomentose form. Scandent to the tops of trees, probably over

30 meters long, very woody, a dm. thick (Poeppig). F.M. Negs. 5601; 5619 (*P. quitensis*).

San Martín: Juanjuí, *Klug 4292* (det. Standley, *P. nobilis*).—Loreto: Iquitos, *Killip & Smith 27230*. Gamitanicocha, Río Mazán, *José Schunke 242*. La Victoria, *Williams 2698; 3127; 2898*. Yurimaguas to Balsapuerto, *Killip & Smith 28284*.

Paullinia hispida Jacq. Hort. Schoenbr. 3: 9. *pl. 268*. 1798; 321.

Liana, notable among Peruvian species by the conspicuous long rigid yellowish trichomes that densely clothe the younger 4–5 sulcate branches, petioles and petiolules; wood simple; stipules scarious, setose-ciliate, ovate-lanceolate, acute or acuminate, 2–3 cm. long, 5–15 mm. broad; rachis more or less margined in the upper segments; leaves subbipinnate with 4–6 pairs of lanceolate or lanceolate-elliptic acute or acuminate subsessile or shortly petiolulate remotely dentate subchartaceous subglabrous pellucid-punctate leaflets, 6–20 cm. long, 2–6 cm. wide, the lowest pair of leaflets 5-foliolate, the second ternate; panicles 5–12 cm. long, fasciculate at defoliate nodes and in the leaf axils, sometimes solitary and elongate in the axils of upper leaves; peduncles with two tendrils; cincinni more or less stiped; bracts and bractlets minute, pedicels 2–3 mm. long; sepals glabrous, the oval inner ones 4 mm. long, half as wide; petals oval-oblong; filaments shortly pilose at base; ovary hispid tomentulose; capsules with stipe nearly 2.5 cm. long, 12–14 mm. wide including wings, these about 5 mm. wide at excised tip, strongly narrowed to stipe, glabrous, reddish, pilose within, seed nearly glabrous.

Loreto: Iquitos, *Killip & Smith 27443*. Soledad, *Killip & Smith 29686*. Mishuyacu, *Klug 752*. Alto Río Itaya, *Williams 3353*. To Panama and Venezuela.

Paullinia hystrix Radlk. Notizbl. Bot. Gart. Berlin 6: 152. 1914; 304.

Allied to *P. echinata* and in general similar but merely scabrellous or somewhat hirtellous on the leaf nerves, the elliptic leaflets with 1 or 2 callose obtuse teeth, the panicles solitary on leafy branches, rusty villous, to 3 dm. long; inner sepals 5 mm. long; petals oblong, 6 mm. long; capsule puberulent and densely echinate with flexible spines 6 mm. long or shorter, the stipe 2 mm. long.—The other related species are *P. paullinioides* (Spruce) Radlk., 303, of Brazil and *P. granatensis* (Planch. & Lind.) Radlk., 304, of Colombia, the former with long-acuminate reticulately veined glabrous leaflets,

capsule stipe 4 mm. long, spines 1 cm. long, the latter with leaflets of *P. hystrix* but glabrous except barbellate in nerve axils, the capsule subsessile, the spines about 1 cm. long. These species, all as yet known from only a few collections, may be found to be variants of one and distributed in Peru, particularly in Loreto and Madre de Dios. F.M. Neg. 5604.

Río Acre: Seringal San Francisco, *Ule 9561*, type.

Paullinia imberbis Radlk. Monogr. Paull. 177. 1895 et Engl. & Prantl, Pflanzenfam. 3, 5: 304. 1895; 263.

Glabrous scandent shrub, the 5-foliolate-pinnate leaves not even barbate in the nerve axils beneath, only the solitary panicles minutely tomentulose; branches 4–5-costate, the wood simple; uppermost leaves sometimes ternate; leaflets elliptic-lanceolate, acuminate, subrotund or acute at base, the terminal cuneate, 8–15 cm. long, 3–7 cm. wide, all shortly petiolulate, above the middle remotely serrate or subrepand, subcoriaceous, lacking mucus, sparsely crystallophorous; petioles (2–8 cm. long) and rachises broadly winged, the wings 3–5 mm. wide each side; stipules linear-lanceolate, 5–12 mm. long; panicles solitary, cincinni sessile, pedicels 2–3 mm. long, articulate above the middle; sepals ashy tomentulose both sides, the outer suborbicular; petals about 5 mm. long, 2 mm. wide; capsule pyriform, shortly stiped (stipe less than 1 cm.), red, the seeds 9–12 mm. long.—*P. ingaefolia* Rusby, Mem. N. Y. Bot. Gard. 7: 291. 1927, from northern Bolivia is apparently similar but larger in all parts; if a valid species it requires a new name. Illustrated, Mart. Fl. Bras. 13, pt. 3. *pl. 81.*

San Martín: Tarapoto, *Ule 6864*.—Loreto: Cerro de Canchahuaya, Ucayali (*Huber 1457*, doubtful, fide Radlk.). Caballo-Cocha, *Williams 2363*. Brazil; Guiana.

Paullinia itayensis Macbr., sp. nov.

Fruticosa; ramis teretibus obscure striatis parce piloso-puberulentis ut etiam petiolis inflorescentiisque; stipulis lineari-lanceolatis circa 5 mm. longis; petiolis rhachisque emarginatis; foliolis 5, oblongo-ellipticis breviter et obtuse acuminatis, basi subacutis, integris chartaceis praeter nervis supra utrinque glabris et glaucentibus, tenuiter reticulato-venosis, supra nitidulis, circa 4 cm. latis et 8 vel 10 cm. longis, breviter petiolulatis; pedicellis fructiferis 1 cm. longis; capsulis subglobosis apiculatis breviter stipitatis subdense strigosis subcoriaceis ecostatis circa 1 cm. crassis.—Section

Enourea. Imperfectly known and identity obscure but given a name for convenience in the vicinity of *P. curvicuspis.*

Loreto: Along Río Itaya, *Williams 75,* type.

Paullinia Josecuatrii Macbr., sp. nov.

Scandens fruticosa; caulis costato-teretibus petiolis paniculisque plus minusve dense puberulis; corpus lignum simplex; stipulis ut videtur caduceis ovatis circa 3 vel 4 mm. longis; petiolis rhachisque conspicue marginatis 3–4 mm. latis; foliolis 5 subsessilibus oblongo-ellipticis basi acutis terminalibus cuneato-attenuatis apice breviter obtuseque acuminatis plerumque 12–15 cm. longis, 5–6 cm. latis, argute repando-mucronato-serratis, chartaceis, supra opacis glabris, nervis 12–15 puberulis approximatis exceptis, subtus nitidulis puberulis praecipue nervis venisque clathrato-reticulatis subpellucido-lineolatis; paniculis solitariis spiciformis breviter pedunculatis 1.5–2.5 dm. longis, cincinni sessilibus contractis, pedicellis vix 2 mm. longis; sepalis puberulis interioribus circa 2 mm. longis; petalis subobblongis eroso-denticulatis 2.5 mm. longis; capsulis longe (circa 5 mm.) stipitatis subglobosis extus sericeo-puberulis intus pilosis circa 1 cm. longis, 8 mm. crassis intense sanguineis.—Simulates *P. castaneifolia* Radlk., 269, of southeastern Brazil to which José Cuatrecasas referred it but that apparently closely related species has acute or acutely acuminate leaflets with emarginate petioles and rachis and subsessile fruits. In the margined leaf-rachis it suggests the similar *P. seminuda* Radlk., 268, of southern Brazil but that species is more pubescent and also with acutely acuminate leaflets. It is true that some species as *P. spicata* Benth. with normally emarginate petioles may exceptionally have them margined but here this character is associated with the obtuse leaflet acumen and therefore is probably a stable significant species indicator. The collector noted the liana as 5 meters tall, the leaf-nerves above pale brown, flowers white, fruits brilliant red.

Loreto: Aguaitia, *Woytkowski 34446,* type.

Paullinia Killipii Macbr., sp. nov.

Fruticosa glabra; ramis floriferis sulcatis 7–15 mm. crassis (corpus lignosum simplex) subfistulosis; stipulis papyraceis ellipticis acutis 2–3 cm. longis, 1–1.5 cm. latis; petiolis emarginatis, petiolulis 5–15 mm. longis; foliolis 5, oblongo- vel late ellipticis subacutis subaequalibus 1.5–2.5 dm. longis, 6–14 cm. latis, reticulato-venosis chartaceo-membranaceis minutissime pellucido-punctatis; paniculis in axillis foliorum glomeratis 1–2.5 cm. longis, pedicellis 2–4 mm. lon-

gis; floribis glabris circa 3 mm. longis; capsulis ad apicem versus late trialatis breviter stipitatis circa 2 cm. longis et latis (alis ad 5 mm. latis).—May be near *P. apoda* Radlk., 318, of Colombia with three pairs of leaflets but the stipules and fruits suggest those of *P. hispida* while the leaves resemble those of *P. nobilis* to which I once referred, carelessly it seems to me now, the type.

San Martín: Juanjuí, *Klug 4200* (det. Standley, *P. nobilis*). —Junín: Puerto Yessup, *Killip & Smith 26383*, type.—Loreto: Santa Rosa below Yurimaguas, *Killip & Smith 28876; 28741*.

Paullinia laeta Radlk. Monogr. Paull. 195. 1895; 277.

Differs, ex char., from *P. subauriculata*: branches densely lenticellate; leaves about 12 cm. long and broad; petioles and leaf-rachis broadly winged, the wings obovate-cuneate, about 3 mm. wide; leaflets elliptic-lanceolate, to 7 (9) cm. long, 3 (5) cm. wide, 1–2 mm. petiolulate, subentire, chartaceous, pale green, lustrous, obsoletely barbate in nerve axils beneath, minutely pellucid-punctate, containing traces of mucus; stipes of cincinni 2–3 mm. long, the pedicels as rachis pilosulous; sepals petaloid, glabrous, the ovate inner 3–4 mm. long; scales bifid, very shortly villous; ovary puberulent.—*Klug 2141* has apically borne spreading panicles about 1.5 dm. long, puberulent young fruits fusiform, stipes 4–5 mm. long, leaflets broadly elliptic, 7–9 cm. long, 3.5–5 cm. wide. F.M. Neg. 23650.

Amazonas: Chachapoyas, *Mathews*, type.—Loreto: Liana in dense forest, Florida, mouth of the Río Zubineta, *Klug 2141*. "Imino-o" (Klug).

Paullinia linearis Radlk. Monogr. Paull. 223. 1895; 291.

Incompletely known but apparently distinctive by the 5–6 pairs of narrowly linear leaflets, the lowest pair ternate, the others acute both ends, entire, sessile, 5–7 cm. long, 4–9 mm. wide, the margined common petiole 4–5 cm. long, the rachis narrowly winged; stipules about 2 mm. long; leaves imparipinnate, glabrous both sides except with immersed glands beneath, epunctate, membranous; wood simple; flowers and fruit unknown.—Said to be a small shrub. F.M. Neg. 31038.

Loreto: Yurimaguas, *Poeppig*, type.

Paullinia Mariae Macbr., sp. nov.

Liana glaberrima inflorescentia et stipula excepta; corpus lignosum simplex; ramulis trigonis 5 mm. crassis costato-sulcatis; stip-

ulis oblongo-lanceolatis 1–1.5 cm. longis, 4 mm. latis, adpresse puberulis; petiolis rhachisque emarginatis leviter costatis, petiolulis 4–5 mm. longis; foliolis 5, late ellipticis obtusis terminalibus ad 18 cm. longis, 8 cm. latis lateralibus 9–12 cm. longis, 5–6 cm. latis coriaceo-chartaceis nitidulis tenuiter reticulato-venosis obscure remoteque ad apicem dentatis vel subintegris paullo vel vix pellucido-lineolatis; paniculis solitariis circa 1 dm. longis puberulis, cincinnis sessilibus, bracteis oblongo-lanceolatis 7 mm. longis, pedicellis 5 mm. longis apice articulatis; sepalis 4 mm. longis; petalis obovatis circa 4.5 mm. longis.—Apparently near *P. tarapotensis* to which Standley referred it but the leaflets are obtuse and the stipules as the bracts are conspicuous. The name commemorates the typist of several numbers of the work, Mrs. Mary Fisher, who noticed with characteristic alertness that I had used originally an untenable name for this beautiful vine.

San Martín: Juanjuí, *Klug 3912*, type.

Paullinia martinensis Cuatr. Fieldiana: Bot. 27, No. 2: 82. 1951.

Pubescent even to the outer calyx lobes except the leaves above, the wood simple, the greenish-gray branchlets subterete, the inflorescences forming sessile glomerules 1–1.5 cm. broad in the axils; leaves 5-foliolate-pinnate, 1.5–2.5 dm. long, the rachis as petiole emarginate, the chartaceous leaflets ovate or oblong-ovate or the terminal subrhombic, all acute, the lateral rounded to truncate at base, entire or coarsely 2–3-dentate above, 4.5–8 cm. long, 2.5–5 cm. wide, the 5–6 lateral nerves prominent the laxly reticulate veins less so, subglabrous above unless the principal nerves; petiolules 2–6 mm. long, the terminal to 12 mm. long; stipules linear, 5–10 mm. long; pedicels 0.1–3 mm. long; outer sepals broadly ovate, 3 mm. long, inner little longer, puberulent; petals 4, glabrous, elliptic-oblong, obtuse; scales half as long, the broader appendage deflexed, lightly barbate, the upper crest bilobed, lower entire; tomentose disk with 2 oblong glands barbellate below; filaments pilose; ovary densely hispid, the 3 styles glabrous.—Like *P. alata* (R. & P.) G. Don but the branches are not winged and contain a simple wood system; it differs from other species by its narrow linear stipules and pubescent leaves, their rachis emarginate. (Description as remark after the author.)

San Martín: Tarapoto, *Woytkowski 35160*, type.

Paullinia mazanensis Macbr., sp. nov.

Scandens fruticosa glabra (inflorescentia excepta); ramulis valde costato-sulcatis; stipulis ignotis; petiolis rhachisque emarginatis striatis, petiolulis circa 3 mm. longis; foliolis 5, ellipticis basi plus minusve acutis apice abrupte tenuiter acuteque acuminatis plerumque 10–13 cm. longis, 4.5–5 cm. latis chartaceis dense reticulato-venosis obscure pellucido-puncticulatis; inflorescentiis solitariis vel paniculatis 8–15 cm. longis puberulis, cincinnis nunc 1- nunc 3–7-floris racemose dispositis; bracteis minutis; pedicellis 1 mm. longis; sepalis interioribus 4.5 mm. longis; petalis oblongis; ovario glabro. Without fruit but perhaps as suggested by Standley in herbaria comparable as well to *P. tarapotensis* as to any other species and apparently undescribed.

Loreto: Gamitanacocha, Río Mazán, *José Schunke 243*, type.

Paullinia neglecta Radlk. Monogr. Serj. 71. 1875; 254. *Semarillaria nitida* R. & P. Fl. Peruv. 4: *pl. 339*. 1802, not *P. nitida* HBK.

Essentially glabrous liana, the branches triangular or 5–6-costate; wood composite with 3 peripheral areas; stipules small, lanceolate; petioles and rachises of the leaves emarginate, the former 2–4 cm. long, the petiolules 4–8 mm. long, all sparsely and laxly puberulent above; ternate (rarely 5-foliolate) leaves 12–15 cm. long, the pinnate ones longer, all nearly as wide, the terminal leaflets 8–13 cm. long, 4–6 cm. wide, obtusely acuminate as the nearly as large lateral, all subacute at base, petiolulate, elliptic-lanceolate, toward the tip more densely repand-dentate, or subentire, subcoriaceous, lustrous, the veins prominent beneath, the nerve axils barbate, pellucid-punctate, lacking mucus; panicles sparsely pubescent, solitary, the cincinni sessile, 4–5-flowered, the pedicels 3 mm. long, articulate at base; sepals subequal; capsule glabrous, subglobose, abruptly contracted to stipe 3 mm. long, about 1 cm. long and broad at seed, this 8 mm. long, glabrous, red. —See remarks under *P. tarapotensis;* the characters used to separate these several plants are doubtfully stable. The ternately leaved *P. cururu* L., 245, scarcely to be expected but possibly, as widely distributed, has margined leaf rachis. F.M. Neg. 5612.

San Martín: Tarapoto, *Williams 6626; 6752*. Juan Guerra, *Williams 6851, 6911*.—Huánuco: Vitoc and Huánuco, *Ruiz & Pavón*, type. Ganso Azul, Río Pachitea, *Sandeman 3381* (det. Standley). —Junín: Chanchamayo, *Isern 2381*. Colonia Perené, *Killip & Smith 25205* (det. Killip).—Ayacucho: Aína, *Killip & Smith 22743*

(det. Killip).—Loreto: Canchahuaya on the Ucayali (*Huber 1389*). Bolivia.

Paullinia nobilis Radlk. Monogr. Paull. 271. 1895; 326.

Indument a minute puberulence, the scandent branches unequally 4–5-costate and sulcate, the wood simple, the 5-foliolate-pinnate leaves with oval-oblong leaflets; stipules subulate, 7–9 mm. long; petioles and rachises emarginate, about 5 cm. long, sulcate, puberulent, the petiolules 2–3 mm. long; leaflets about 10 cm. long and about half as wide, the lower lateral ovate, all shortly acuminate, acute or rounded at base, subentire or remotely and rather coarsely repand-dentate, chartaceous, nearly glabrous above except the mid-nerve, minutely puberulent beneath and punctate-lineolate, often branched pellucid, lacking mucus; panicles solitary, pulverulent, the cincinni shortly stiped, to 7-flowered, the pedicels in fruit 4 mm. long, articulate at base; sepals minutely puberulent, the inner oval 4 mm. long; petals apparently oblong; capsule 3-winged, obovate, emarginate, puberulent without, pubescent within, the stipe 6–8 mm. long; seed somewhat pubescent, nearly to the middle arillate. —*P. boliviana* Radlk., 327, has greenish instead of reddish-brown branches, serrate oblong-lanceolate leaflets 7 × 2–3 cm.; smaller (about 2 cm. long) glabrate capsule with 5 mm. long stipe, glabrous seed; *P. caloptera* Radlk., 329, allied, of Brazil and Venezuela is nearly glabrous, the leaf-rachis narrowly margined, leaflets densely pellucid-punctate, stipules lanceolate, seeds pilose. Since so many specimens have been placed here in herbaria the author's description is included but the plant seems to be only a glabrate state of *P. gigantea*. F.M. Neg. 5613.

Loreto: In woods, Yurimaguas, *Poeppig*, type; addenda *93*. Leticia, *Ule 6194*, fide Radlkofer. Ecuador; Brazil.

Paullinia obovata (R. & P.) Pers. Syn. Pl. 1: 443. 1805; 259. *Semarillaria obovata* R. & P. Prodr. 54. 1794.

Nearly glabrous liana, only the younger parts slightly puberulent and the leaves often barbate beneath in the axils of the rather prominent nerves; branches three-angled and 5–6 costate, 3–5 mm. in diameter; wood simple; petioles and rachis emarginate; leaves 5-foliolate, the terminal leaflets somewhat obovate, the lateral oblong-lanceolate, subrounded at base, all acuminate, rather coarsely dentate, petiolulate (petiolules to 5 mm. long), subchartaceous, clathrate veined, to 11 cm. long nearly 5 cm. wide, usually smaller,

the epidermis lacking mucus; panicles solitary, dense, 10–15 or sometimes to 45 cm. long, the sulcate rachis 3–4 mm. thick, tomentulose with sessile contracted 5–7 flowered cincinni; bracts and bractlets minute deltoid; pedicels articulate at base; sepals densely ashy tomentulose, ovate, petals oblong; capsules pyriform, subligneous, finally glabrescent, about 3 cm. long and half as broad, the stipe about 1 cm. long; seed nearly completely arillate, about 1 cm. long and half as broad.—This is the earliest name in a group of closely allied plants. Illustrated, Ruiz & Pavón, Fl. Peruv. 4: *pl. 338.* F.M. Neg. 23655.

The Indians eat the fleshy white sweet arils that half cover the seeds (Ruiz & Pavón).

Huánuco: Macora, *Ruiz & Pavón,* type.—Loreto: Gamitanacocha, Río Mazán, *José Schunke 118* (det. Standley). Brazil. "Monte lucuma" (Ruiz & Pavón), "patgo-huayo" (Schunke).

Paullinia olivacea Radlk. Notizbl. Bot. Gart. Berlin 6: 151. 1914; 291.

Scandent nearly glabrous but the terete striate or lightly sulcate branches lenticellate apically and evanescently puberulent-hirtellous; wood simple; leaves imparipinnate with 2 pairs of oval or suboblong-lanceolate obtusely acuminate leaflets, the terminal one cuneate at base, the lateral acute, all sessile, remotely and obtusely dentate, membranous-chartaceous, reticulate-veined, glabrous, lustrous, olive-green above, lightly puberulent especially on the nerves beneath and microscopically stipitate glandular, densely lineolate and punctate pellucid, lacking mucus, 6–12 cm. long, 2.5–5 cm. wide, the winged rachis 1.5–2.5 cm. long, the common petiole 3–5 cm. long with wings 2–3 mm. wide; panicles solitary, puberulent, the slender rachis dense, the cincinni sessile, the pedicels and small bracts canescent as at least the sepals in bud, these in part connate medially, the inner 2.2 mm. long; petals oblong, glandular both sides, small; ovary glabrous, globose, long-stiped; fruits of *Killip & Smith* specimen to nearly 1.5 cm. thick, the stipe to 7 mm. long.—As suggested by the author the species is very near *P. pterophylla* Tr. & Pl. but in the few specimens seen the fewer leaflets and glabrous fruits seem to be concomitant characters. F.M. Neg. 5614.

Loreto: Santa Rosa below Yurimaguas, *Killip & Smith 28966.* —Puno: San Gován, *Lechler* 2332a type, pt.—Río Acre: Seringal San Francisco, *Ule 9563; 9576.*

Paullinia pachycarpa Benth. in Hook. Journ. Bot. Misc. 3: 196. 1851; 296.

Glabrous except for the rusty tomentulose tips of the slightly three-winged or subterete lenticellate branches, the flowering 3–5 mm. thick, and the solitary or paniculate sessile or pedunculate panicles; wood simple; petioles and rachis wing-margined; stipular scars broad, semiamplexicaul; leaves imparipinnate, the lower pair of leaflets ternate; leaflets subelliptic or oblong with a more or less elongate obtuse acumen, all sessile, remotely serrate-dentate, rarely subentire, coriaceous-chartaceous, transversely veined, subopaque both sides, rather densely pellucid-punctate and lineolate 6–20 cm. long, the lowest lateral smaller, epidermis lacking mucus; panicles congested, stout, the stiped cincinni more or less contracted, the elliptic lanceolate bracts 4–6 mm. long; pedicels short; sepals canescent tomentulose, the high-connate inner 5 mm. long, subcoriaceous; petals 7 mm. long, oval-oblong; filament trichomes long, whitish, abundant; capsules globose, 1.5–3 cm. long with stipe 5–15 mm. long, velvety tomentulose without, pubescent within, the pericarp thick; seed nearly enclosed by the aril.—The Peruvian material was distributed as *P. grandifolia* Benth. ex Radlk., 294, weakly distinguished by the scarcely emarginate rachis; both plants may prove to be a part of *P. ingaefolia* Richard, 295, with, however, sessile cincinni. F.M. Neg. 5617.

San Martín: Tarapoto, *Williams 6743.*—Loreto: Timbuchi on Río Nanay, *Williams 864.* Manfinfa on Río Nanay, *Williams 1086.* Iquitos, *Tessman 3609.* Mishuyacu, *Klug 825; 1369.* To Venezuela.

Paullinia paullinioides [Spruce] Radlk. Monogr. Serj. 75. 1875; 303.

Glabrous, the terete branches 2–3 mm. in diameter above; wood simple; petioles emarginate; stipules minute, triangular; leaves ternate; leaflets elliptical, subacute at base, rather long acuminate, entire or the lateral usually with a callosed tooth at least on the inner revolute margin near the base, all long-petiolulate, coriaceous, closely reticulate-veined, subopaque above, slightly lustrous beneath, often 8–14 cm. long, the epidermis containing mucus; panicles solitary or panicled, sparsely puberulent, the rachis scarcely 1 mm. thick, the sessile or shortly stiped cincinni contracted, pedicels about 3 mm. long, articulate medially or lower; sepals tomentulose, the inner connate, about 4 mm. long, subpetaloid; petals oblong-oval; filament trichomes white; capsules ellipsoid-globose, apiculate,

2.5–3 cm. long, the abundant spines to 1 cm. long, the pericarp about 3 mm. thick, glabrous within, subglabrate without, the stipes about 4 mm. long; seed glabrous, arillate to the middle.—This may be the proper name for *P. Sprucei* since that appears not constant or not recollected; at least most of the following material has leaflets with one or two calluses on one or more leaflets or the fruits are closely echinate; Killip & Smith collections det. Killip. The species name was unpublished by Spruce under *Castanella*. Illustrated, Radlkofer, l.c. 221 (fruit).

Loreto: Yurimaguas, *Williams 7374; 8858; Killip & Smith 27570; 27981*. Santa Rosa, *Killip & Smith 28762*. Near mouth of the Río Tigre, Río Marañón, *Killip & Smith 27526*. Northern Brazil.

Paullinia pinnata L. Sp. Pl. 366. 1753; 247.

Nearly glabrous, the scandent trigonous branches 5–6-costate, usually sparsely pubescent or subtomentose on the angles; wood typically composite with 1–3 peripheral areas; stipules linear-subulate, 3–7 mm. long, rarely lanceolate and to 15 mm. long; petioles and rachises commonly broadly winged, the former 2–6 cm. long or longer, the latter 2–3 cm. long; leaves 5-foliolate-pinnate, the terminal leaflet 7–12 cm. long or longer, 3–5 cm. wide, the lateral little smaller, all ovate, oblong or lanceolate, obtuse or acute both ends, shortly petiolulate, remotely serrate, subcoriaceous, lustrous, sometimes sparsely pubescent and barbate in the nerve axils, usually pellucid-punctate and lineolate, lacking mucus; panicles solitary, usually racemiform, pubescent, the cincinni subsessile, the 2–4 mm. long pedicels articulate near the base; flowers 3–5 mm. long; sepals obscurely if at all costate, the outer appressed puberulent; scales with deflexed appendages (the upper), the crest of the lower aliform; capsule clavate, 2–3 cm. long, 10–14 mm. broad, apiculate, sometimes more or less crenate; seed 12–15 mm. long.—The similar and widely distributed *P. cururu* L., 245, has ternate leaves.

The plant contains a toxic alkaloid (as *P. cururu*) and is used as a "fish poison."

Huánuco: Pozuzo, *Ruiz & Pavón* (fide Radlk.). Widely distributed in warm America; Africa. "Timbo."

Paullinia pterophylla Tr. & Pl. Ann. Sci. Nat. sér. 4. 18: 354. 1862; 290.

Glabrous or glabrate except the younger parts, the flowering branches lenticellate, 3–6 mm. in diameter; wood simple; stipules

linear-lanceolate, 4–5 mm. long; petioles and rachis broadly wing-margined; leaves imparipinnate with 3–4 pairs of lanceolate-oblong acuminate sessile leaflets, the terminal cuneate at base, the lateral acute, all serrate above the middle, chartaceous, reticulate-veined, lustrous, obscurely pellucid-punctate and -lineolate, to 11 cm. long, 5 cm. wide, usually 5–9 cm. long, 2–3 cm. wide, drying fuscescent, paler beneath, the epidermis lacking mucus; panicles half shorter than the leaves, solitary, the bracts and bractlets subulate, scarcely 1 mm. long, the slender rachis about 1 mm. thick with sessile contracted cincinni, the pedicels 1.5 to 2 mm. long; inner sepals more or less connate, 2.5 to 3 mm. long, subpetaloid, appressed puberulent without, the half as long outer two subcoriaceous; filament trichomes sparse, whitish; capsules globose, abruptly contracted to stipe 4–6 mm. long, shortly tomentose without, laxly pubescent within, the subglobose seed nearly completely arillate.—*P. olivacea* probably will prove to be a variant but no intermediates seen. Fruit edible. F.M. Neg. 23654.

Pasco: Oxapampa, *Soukup 1823*.

Paullinia rhizantha Poepp. & Endl. Nov. Gen. & Sp. 3: 36. *pl. 243*. 1844; 243.

Similar to *P. alata* and not clearly distinct but according to the authors the older branches narrowly wing-angled, the younger, according to the monographer, deeply 6-sulcate, 6-costate, the costae hirtellous; leaves glabrous; petioles 7–15 cm. long, rachis 3–4.5 cm. long, wings 1.5–2.5 mm. wide both sides; petiolules 3–5 mm. long; terminal leaflets 14–18 cm. long, 6–10 cm. wide, the lateral smaller, elliptic-ovate to obovate, angulate- or subrepand-dentate; panicles 2–2.5 cm. long, the pedicels 6–8 mm. long, medially articulate.—Flowers according to Spruce, slightly larger. It is possible that most or all of the specimens from Loreto cited under *P. alata* var. *loretana* should be placed here, as they have the wide leaflets of this species; this character seems to vary, as also degree of pubescence.

Loreto: Yurimaguas, *Poeppig 2239*, type; also addenda *50*.—Río Acre: *Ule 9565*. Brazil; Colombia.

Paullinia rugosa Benth. ex Radlk. Monogr. Serj. 75. 1875; 287.

More or less hirtellous liana with 4–5 sulcate branches 4–6 mm. in diameter, the wood simple; stipules conspicuous, suborbicular, 3–4 mm. long, densely pubescent without, stellate incised; petioles

and rachis emarginate; leaves 5-foliolate, the broadly elliptic or suborbicular leaflets typically obtuse, the lateral sometimes cordate at base, all shortly petiolulate, obscurely repand-dentate or entire, 6–18 cm. long, 4–10 cm. wide, coriaceous, drying reddish beneath, laxly and obscurely clathrate-veined and obscurely pellucid-punctate, the epidermis lacking mucus; panicles much shorter than the leaves, solitary or panicled, sessile or peduncled, 5–12 cm. long, the rachis 2–3 mm. thick, the sessile contracted cincinni approximate; bracts 2–3 mm. long, nearly as wide, the lanceolate subulate bractlets smaller; pedicels 4–5 mm. long, nearly apically articulate; sepals ashy-tomentulose, almost entirely free, the inner about 4 mm. long, coriaceous; petals obovate, about 5 mm. long; filament trichomes brownish, abundant; capsules shortly stiped, trigonous subglobose, densely reddish-hirtellous within and without.—The Peruvian species is only in flower but seems to belong here; it has, however, a slight difference in leaflets and may become var. **peruviana** Macbr., var. nov., foliolis breviter obtuseque acuminatis. F.M. Neg. 5624.

Loreto: Yurimaguas, *Killip & Smith 27947*. Northern Brazil.

Paullinia serjaniaefolia Tr. & Pl. Ann. Sci. Nat. sér. 4. 18: 356. 1862; 339. *Paullinia selenoptera* Radlk. Monogr. Paull. 303. 1895; 339.

Scandent shrub, glabrous except the puberulent petioles and panicles, these solitary, about 5 cm. long; branches triangular, lightly 3–4-sulcate, wood simple; stipules linear-subulate, 5–6 mm. long; petioles 0.5–3 cm. long, sulcate above, the rachis 1–2 cm. long, wings both sides scarcely 1 mm. wide; leaves biternate or typically with sometimes two pairs of leaflets, the lowest ternate, the terminal leaflets about 5 cm. long, 2–2.5 cm. wide, long-attenuate at base, acuminate, the lateral gradually smaller, acute, all sessile, remotely serrate, submembranaceous, scarcely nitidulous, glabrous, punctate and lineolate-pellucid, lacking mucus; panicles short, peduncled and solitary or sessile on older branches; flowers apparently small, puberulent; capsule broadly 3-winged, the broad wings semicircular, subsessile, excised at apex, glabrous, within pubescent; seeds ellipsoid, pilose, one-third arillate.—The forma *setuligera* Radlk. of *P. selenoptera* from Brazil has peduncle-angles, stipules and leaf-margins setulose. From the Peruvian material and the Colombian from the region of the type it does not seem that the number of leaflets is significant since at least one Peruvian collection (*Killip*

& Smith 28065) has two pairs of leaflets; and material with sessile panicles is nearly *P. pterocarpa* Tr. & Pl., 338, but the leaflets are not entire and the rachis is margined. Illustrated, Mart. Fl. Bras. 13, pt. 3: *pl. 90.* F.M. Neg. 23657 (*P. selenoptera*).

Loreto: Yurimaguas, *Poeppig*, type; *Killip & Smith 28065; Williams 7879; 5341; 4196.* Sierra del Pongo, 500 meters, mature fruit rose-red, *Mexia 6277* (det. Standley). Balsapuerto, *Killip & Smith 28666.* Mishuyacu, *Klug 10; 583; 807.* Brazil. "Curubahuasca," (Williams).

Paullinia setosa Radlk. Notizbl. Bot. Gart. Berlin 6: 154. 1914; 327.

Sulcate branches, peduncles of the solitary bicirrose panicles, petioles and petiolules densely and more or less fasciculately long-setose; stipules ovate-lanceolate, scariose, marginally setulose, 1.5 cm. long, 5–7 mm. wide; petioles emarginate, 8 cm. long, rachis 5 cm. long, narrowly wing-margined (1.5 mm. each side); leaves 5-foliolate-pinnate, the oval or suboblong leaflets 10–16 cm. long, 4.5–8.5 cm. wide, the terminal obovate-subrhombic, attenuate at base, the upper lateral acute, the lower rounded at base, all acuminate, remotely few-dentate, membranous, finely reticulate, both sides on nerves, veins and margins, sparsely and finely setulose, slightly punctate and lineolate-pellucid, lacking mucus; bracts 8 mm. long, similar to stipules, the pedicels as long; sepals elliptic; petals 6 mm. long, 3 mm. wide, little glandular; ovary (male flowers) pilose.—Suggests both *P. gigantea* and *P. caloptera* (cf. under *P. nobilis*), and until fruit is known its position uncertain (Radlkofer). If a branch of *Krukoff 9041* from São Paulo de Olivença belongs to the sterile specimen as preserved at Chicago the fruits are about 2 cm. wide and long, the wings nearly as broad at base as apex and thus resemble somewhat those of *P. serjaniaefolia* and are congested at defoliate nodes. The species thus must have either sessile or peduncled panicles as *P. caloptera. P. scaberula* R. E. Schultes, Bot. Mus. Leaflets Harvard. 13: 271. 1949, from the same locality and therefore probably to be found within Amazonian Peru apparently would be sought here in flower but the fruits are exalate and the branchlets are "black scaberulent." F.M. Neg. 5625.

Río Acre: Seringal San Francisco, *Ule 9562*, type. Brazil?

Paullinia simulans Macbr., sp. nov.

Liana glabra vel glabriuscula; corpus lignosum simplex; ramis valde costato-sulcatis, trigonis, 5 mm. crassis; stipulis persistentibus

oblongo-lanceolatis circa 1 cm. longis striatis; petiolis rhachisque emarginatis; petiolulis 3 mm. longis; foliolis 5, oblongo-ellipticis breviter obtuseque acuminatis 8–15 cm. longis, 3.5–6 cm. latis ad apicem remote denticulatis chartaceis paullo nitidulis vix pellucido-punctatis reticulato-venosis; paniculis sessilibus vel longe pedunculatis interdum bicirrosis 4–8 cm. longis densifloris, cincinnis sessilibus pulverulentis; floribus ut videtur circa 3 mm. longis; pedicellis 1 mm. longis; bracteis 2.5 mm. longis subulatis; ovario puberulo.—Seemingly allied to *P. tarapotensis* but the conspicuous stipules persisting; it suggests also in general appearance *P. spicata* with deciduous stipules, composite wood, glabrous ovary.

Loreto: Wooded banks of Río Itaya above Iquitos, *Killip & Smith 29547*, type (det. Killip, *P. tarapotensis?*). Mishuyacu, *Klug 445*. Florida, Río Pishingo, *Klug 2101?*

Paullinia sphaerocarpa Rich. ex Juss. Ann. Mus. Nat. hist. Nat. Paris 4; 348. 1804; 298.

Nearly glabrous liana, the younger lenticellate subterete branches 2–3 mm. in diameter, the wood simple; petioles emarginate, the rachis wing-margined or in Peru obscurely; stipules minute, broadly triangular; leaves 5-foliolate, the oval or oblong leaflets acuminate, the terminal attenuate-cuneate at base, the lateral acutish or rounded, all remotely, sometimes rather coarsely crenate-dentate, 4–12 cm. long, sessile or petiolulate, membranous-chartaceous, laxly subclathrate-veined, lustrous both sides but paler beneath, the epidermis containing mucus; panicles solitary or panicled, puberulent, more or less peduncled, to 3 dm. long, the laxly flowered rachis about 1 mm. thick with sessile or shortly stiped cincinni, the pedicels 2 mm. long; bracts and bractlets minute; sepals ashy-tomentulose, the membranous inner about 2.5 mm. long, all free; filaments hirsute-pilose; capsules subsessile, lanate within, finally glabrate without, about 2 cm. in diameter.—Illustrated, Radlkofer, l.c. 221. F.M. Neg. 5626.

Loreto: Iquitos, *Williams 3641*. Mishuyacu, *Klug 190*. To the Guianas.

Paullinia spicata Benth. in Hook. Journ. Bot. Misc. 3: 193. 1851; 256.

Liana, glabrous or essentially except the solitary spiciform panicles, the branches subtriangular or 4–6 costate, about 5 mm. in diameter, the wood composite with three smaller peripheral columns;

petioles and rachis emarginate, at least in Peru; leaflets 5 or rarely the uppermost leaves ternate; leaflets oblong or oblong-lanceolate, acuminate or acute, the terminal cuneate below the middle, the lateral rounded or acutish at base, all shortly petiolulate, repand-dentate or remotely serrate, subcoriaceous or chartaceous, very lustrous both sides, faintly reticulate-veined, barbate beneath in the nerve axils, conspicuously pellucid-punctate and lineolate, the epidermis lacking mucus, the terminal leaflets about 1 dm. long and half as wide or in Peru somewhat larger, the lateral little smaller; petiolules 2–5 mm. long; panicles subsessile or long-pedunculate, the tomentulose rachis deeply sulcate, the subulate bracts about 5 mm. long, the many-flowered cincinni sessile; pedicels stout, 2 mm. long, articulate above the base; sepals tomentose puberulent, the inner about 4 mm. long, 3 mm. wide; petals narrowly oblong-acutish; filaments pilose; capsules 2.5 cm. long, 1 cm. broad, strongly spongy thickened within, glabrous; seed compressed ellipsoid, nearly completely enclosed in the aril, about 1 cm. long, 3–4 mm. wide.—The Peruvian specimen matches one by Claussen determined by Radlkofer at Paris (Killip). Acumen in Peru obtuse. F.M. Neg. 5998.

Loreto: Between Yurimaguas and Balsapuerto, *Killip & Smith 28167* (det. Killip). Brazil to Ecuador and the Guianas.

Paullinia Sprucei Macbr. Candollea 6: 12. 1934; 305. *P. riparia* Spruce ex Radlk. Monogr. Serj. 75. 1875, not HBK., 1821.

Glabrous with scandent terete branches, simple wood, ternate leaves; petioles 4 cm. long, terete but narrowly sulcate, the petiolules 2–4 mm. long; leaflets elliptic, subacute at base, shortly acuminate, the acumen obtuse, entire but revolute-margined, coriaceous, subclathrate venose, nitidulous, containing mucus, 9–12 cm. long; panicles solitary to 3 dm. long, the cincinni sessile, the fruiting pedicels 3–4 mm. long; capsule globose, the stipe about 3 mm. long, sparsely echinate with rigid spines 4–7 mm. long; seeds about 12 mm. long, two-thirds arillate.—Distinct from the other allied species (*P. echinata*, etc.) by the spongy instead of compact mesocarp. The name was *Castenella riparia* Spruce, in herb.

Loreto: Yurimaguas, at the junction of the Río Huallaga and the Río Marañón, *Spruce 3883*, type.

Paullinia subauriculata Radlk. Monogr. Paull. 196. 1895; 276.

Scandent shrub, the trigonous-subterete branches lightly yellowish-pilose at tips, the wood simple, the 5-foliate-pinnate leaves about

16 cm. long and as broad; stipules minute, deltoid, axillary, geminate; petioles margined or winged above, leaf-rachis winged, both 3–4 cm. long, the petiolules 2–4 mm. long; upper leaflets 9–10 cm. long, 4 cm. wide, elliptic, shortly and obtusely acuminate, acute at subsessile base, the lower about 7 cm. long, 3.5 cm. wide, ovate, subauriculate-bidentate, all rigid-coriaceous, olive-green, subopaque, epunctate, containing mucus, the lateral nerves arcuate-ascending, reticulate-veined, especially beneath where sparsely barbate in the nerve-axils, the nerves above and marginally puberulent; panicles solitary, rachis pilose, pedicels puberulent, 3 mm. long; cincinni subsessile; sepals free, sparsely appressed puberulent (male buds); petals oval, the scales villous; ovary rudimentary, the style puberulent. F.M. Neg. 6000.

Cajamarca: Tambillo, *Jelski 413*, type.

Paullinia subrotunda (R. & P.) Pers. Syn. Pl. 1: 443. 1805; 260. *Samarillaria subrotunda* R. & P. Prodr. 54. 1794.

Scandent, the striate or ultimately 4–5 sulcate branches minutely rusty-tomentose, the wood simple, the leaves 5-foliolate-pinnate; stipules unknown; petioles 5–7 cm. long, petiolules 3–8 mm. long and as the rachises emarginate, somewhat puberulent; terminal leaflet 9–14 cm. long, 5–7 cm. wide, cuneate at base, the somewhat smaller lateral rounded, the upper obovate (-oblong), the lower ovate-subrotund, all rounded at base, shortly apiculate-acuminate, minutely serrate toward the bidenticulate short acumen, chartaceous, clathrate-veined, more or less barbellate beneath and tomentulose or finely argenteous (Poeppig) with laterally affixed trichomes, sparsely pellucid-punctate, lacking mucus and not crystallophorous; panicles solitary with dense sessile cincinni, the 2–3 mm. long pedicels articulate; sepals densely puberulent, the inner subrotund, 3–4 mm. long; petals oblong, scales of related *P. tarapotensis;* fruit pyriform, subglobose, green, finally glabrous, larger than a walnut (Poeppig).—This seems to be too near *P. faginea*, the only apparent difference being the almost minute acumination with two dentations and the subrotund lateral leaflets; the latter character is approached in some material of *P. faginea* but I have seen no specimen with the same acumination. Illustrated, Ruiz & Pavón, Fl. Peruv. 4: *pl. 336*. F.M. Neg. 5629.

As in some other species, for instance, *P. obovata*, the Indians eat the fleshy arils that half cover the seeds (Ruiz & Pavón).

Huánuco: Vitoc, *Ruiz & Pavón*, type. Cuchero and Pampayacu, *Poeppig 1327*. "Lucumas de monte."

Paullinia tarapotensis Radlk. Bot. Jahrb. 37: 151. 1905; 258.

Scandent shrub, completely glabrous except the somewhat tomentulose solitary panicles including the rachis, sepals and ovary; branches sulcate, 6-costate, the ligneous structure simple; stipules deciduous, not known; leaves 5-foliolate-pinnate; petioles and leaf-rachises emarginate, the former 5–8 cm. long, the terminal petiolule 6–8 mm. long, its obovate-subcuneate leaflet 10–12 cm. long, 5 cm. wide; lower leaflets ovate, the intermediate oval, all narrowly and obtusely caudate, remotely and obtusely crenate-dentate, petiolulate, membranous, glabrous, the arcuate-ascending lateral nerves prominent beneath, reticulate, epunctate, lacking mucus; lower panicles subsessile, spiciform, ecirrose, the upper long-peduncled, bicirrose, the short cincinni sessile, the pedicels scarcely 2 mm. long, articulate below the middle; petals oblong, 3 mm. long, nearly equaled by the inner sepals, the upper scale crest obcordate and with deflexed appendage, the lower aliform.—As remarked by the author, intermediate to *P. elegans* Camb., 255, and *P. spicata* Benth., 256, both known from adjacent lands and to be expected; both have composite wood (but the related *P. pinnata* may rarely have simple wood, suggesting that the character alone may not always be significant), the former with narrower subacute leaflets barbate in the axils, larger flowers, the latter with all panicles spiciform, slightly larger flowers, leaflets barbellate in nerve-axils. It is possible that *P. neglecta* should include this in spite of the simple wood and five leaflets as to types. F.M. Neg. 5630.

San Martín: Juan Guerra, *Ule 6613*, type. Tarapoto, *Williams 6633*.

Paullinia tenera Poepp. & Endl. Nov. Gen. & Sp. 3: 37. *pl. 243.* 1844; 317.

Lightly sulcate 5–6-angled younger branches as also the sulcate petioles (2–4 cm. long) setose-hirsute with reddish trichomes; stipules subulate-lanceolate, ciliate, 5–10 mm. long, 1–2.5 mm. wide; wood simple; leaves imparipinnate, the lower of the 4 pairs of lanceolate-sublinear leaflets ternate; rachis segments about 2 cm. long; leaflets subsessile, acute at base, sharply acute at tip or with 1–2 teeth near base, entire, subchartaceous, glabrous, lustrous, green, epunctate, lacking mucus, 7–11 cm. long, 1–2 cm. wide; panicles glabrous except the apically setulose small bracts, about 1 cm. long, congested at defoliate nodes, the pedicels about 4 mm. long, sepals glabrous, the inner 3 mm. long; petals oblong, the scales

with barbate deflexed appendage, the filaments white-pubescent; capsule obovate with narrow terminal wings, glabrous, the seed with white bilobed aril.—This type was scandent, creeping among mosses and defoliate while Klug noted it as a liana. It seems probable that this may be the earliest name for several similar plants as *P. bidentata*, *P. fistulosa* and *P. linearis*, all little known. F.M. Neg. 5631.

Huánuco: Cuchero, *Poeppig 1090*, type.—San Martín: Tarapoto, *Ule 5817*. Juanjuí, *Klug 4193* (det. Standley).

Paullinia tenuifolia Standley, sp. nov. in herb.

Scandens fruticosa glabriuscula; corpus lignosum simplex; ramis teretibus circa 4 mm. crassis (cortice canescente); ramulis subherbaceis leviter costatis vix 2 mm. crassis sparse ciliato-pilosis; stipulis lineari-subulatis 5–7 mm. longis; petiolis rhachisque tenuis minute costato-striatis, costis plus minusve dense ciliato-pilosis; foliolis 5, subsessilibus vel terminalibus basi attenuato-petiolatis ovato-oblongis vel ovatis anguste caudato-acuminatis remote arguteque dentatis glabris membranaceis plerumque 6–7 cm. longis 2.5–3.5 cm. latis tenuissime laxe reticulatis nervis lateralibus circa 7; paniculis 1–3-fasciculatis racemiformis 8–10 mm. longis minute puberulis; cincinnis subsessilibus; pedicellis circa 1 mm. longis; floribus ut videtur vix 1.5 mm. longis; capsulis glabris obovoideis 12 mm. longis, 7 mm. crassis.—Since there is no indication by the author as to the probable relationship of this delicate liana I may, as perhaps often in other cases, be doing him a disfavor in publishing it for him as undescribed; it seems to me to be distinctive in its extremely thin leaves and small flowers, mostly borne on the older and leafless nodes.

Loreto: Fundo Indiano near Iquitos, climbing to 4 meters in dense forest, *Mexia 6394*, type.

Paullinia trilatera Radlk. Monogr. Paull. 254. 1895; 314.

More or less hirsute scandent shrub, the sharply three-sided branches about 1 cm. in diameter and notably setose at the angles; wood composite; stipules lanceolate, about 1 cm. long, 3 mm. wide; rachis submargined, the nearly triangular petioles subhirsute on the angles; petiolules 2–3 mm. long or the terminal longer; leaflets 5, the terminal subrhombic, the upper lateral oblong-lanceolate to 15 cm. long, 6 cm. wide, often somewhat smaller, the lower ovate, all long-acuminate, remotely and obsoletely serrate, membranous,

glabrous above, somewhat hirsute beneath, not punctate or containing mucus; panicles glomerulate on older branches on the leaf axils, scarcely 1 cm. long, the 7–8 mm. long pedicels articulate toward the base; outer sepals very small, the obovate inner about 3 mm. long, glabrous; petals obovate-oblong, more or less unguiculate; stamens glabrous; capsules broadly obovate or obcordate, attenuate to the slender stipe, this about 1 cm. long, conspicuously 3-winged, 2.5–3 cm. long, the wings about 5 mm. wide on each side, glabrous without, densely pilose within; seed ellipsoid, slightly pilose, 10–12 mm. long, nearly as broad.

Peru (probably). Río Putumayo, Peru-Colombia boundary, *Klug 1606*. Amazonian Brazil.

Paullinia uchocacha Macbr., sp. nov.

Fruticosa praeter inflorescentibus glaberrima; ramis teretiusculis leviter striatis; petiolis rhachisque circa 6–striatis haud marginatis; foliis 5-foliolato-pinnatis; foliolis ellipticis basi acutis apice obtuse subcaudato-acuminatis, lateralibus breviter, terminalibus longe petiolatis integris vel interdum ad basin grosse bidentatis, plerumque 6–8 cm. longis et circa 4 cm. latis, chartaceo-coriaceis sparse pellucido-lineolatis utrinque nitidulis et conspicue reticulato-venosis subtus glandulis immersis adspersis; inflorescentiis solitariis ad 1 dm. longis, parce pulverulentis; bracteis subulatis, parvis; floribus circa 3-fasciculatis, tomentulosis circa 3 mm. longis; sepalis 2 exterioribus 1–1.5 mm. longis, subglabris, ovalibus; pedicellis circa 2 mm. longis; capsulis subligneo-coriaceis depresse subglobosis 1.5 cm. crassis breviter abrupteque stipitatis extus et intus glabris exalatis subverrucosis ut videtur rubris.—If the detached fruit belongs to these flowering specimens this seemingly is a very distinct species, as in foliage it is quite different from others in the section *Enoura* to which the fruit-character apparently best refers it. While most comparable in Peru to *P. curvicuspis* the leaves bear some resemblance also to those of *P. reticulata* Radlk., 272, of Amazonian Brazil but the leaflets in that species are acutely acuminate and subsessile. The name proposed is a union of the native names as recorded by the collector, omitting "huasco" (i.e. liana); cf. *Williams*, Field Mus. Bot. 15: 536. 1936.

Loreto: Maquisapa on the Río Nanay, *Williams 1211*, type; *1209*. "Uchohuasco," "cacha."

Paullinia yoco Schultes & Killip, Bot. Mus. Leaflets Harvard 10: 302. 1942.

Widely spreading liana, the robust scabro-lenticellate stems attaining 12 cm. in diameter, the younger branches pulverulent and with approximate stout tendrils, these becoming woody; leaves usually 5-foliolate to 3.5 (4.5) dm. long and nearly as wide, the sparsely puberulent rachis sulcate but emarginate; leaflets elliptic (upper obovate), all shortly and obtusely acuminate, entire, coriaceous, chartaceous, glabrous (except puberulent nerves), 1.5 to 2.5 dm. long, 8–11 cm. wide, dark green but lustrous, drying yellowish-brown beneath, clathrate-veined, the 7–9 nerves prominent; panicles solitary, sparsely pulverulent, 10–15 (25) cm. long, the rachis 3 mm. thick, axillary, racemiform, sometimes with a tendril; pedicels 3–8 mm. long, minutely hirtellous as the acuminate bracts; outer 2 sepals subcoriaceous, tomentulose without and ciliate as the larger membranous inner three; petals entire, obovate, minutely pilose within, 2.3 mm. long; filaments lanate; ovary globose, glabrous, the stigma deeply trifid; fruits subdrupaceous, obliquely ovoid, 10–14 mm. long, 4–7 mm. wide, attenuate into stipe, red. —Appears to be most closely related to *P. clathrata* Radlk., 302, of Amazonian Brazil which is much larger and has pubescent subdentate leaflets; there are also several floral differences (authors). In Peru it suggests greatly *P. cupana* sens. lat. including the var. *sorbilis*.

Klug and Schultes found all the softer tissues of the bark, stems and wood used to extract the white or brownish sap which in 1927 was analyzed as containing 2.73 per cent caffeine (cf. Rouhier and Perrot, probably this plant, Bull. Sci. Pharm. 33. 537–539: 1926; Trav. Lab. Med. 17, pt. 6. 1926; Compt. Rend. 182: 1494. 1926; Chem. Zentrbl. 1: 138. 1927. According to the authors, the Indians in adjacent Colombia regularly used this product as a breakfast beverage.

Loreto: Near the upper Putumayo, fide Schultes, l.c. 321. Adjacent Colombia and Ecuador. "Yoco," "yoco blanco," "yoco colorado," "huarmi yoco."

3. URVILLEA HBK.

Cirrose scandent shrubs similar in habit to the more slender species of *Serjania* but the petioled leaves nearly always 3-foliate, sometimes the terminal leaflet triparted, the lateral deeply lobed. Fruit samaroid-capsular, membranous or chartaceous, 3-winged, the cells reticulate, the wings radiately venose.

Urvillea ulmacea HBK. Nov. Gen. & Sp. 5: 106. 1821; 357.

Scandent, sparsely pubescent, the adult stems deeply trisulcate, the flowering 1.5–2 mm. thick; stipules small, ovate-lanceolate; leaves normally ternate; petioles to 5 cm. long, terminal leaflet to 9 cm. long and 4.5 cm. wide, attenuate to petiolule, the lateral little smaller, abruptly contracted to short petiolules, ovate or ovate-lanceolate, acute or acuminate, mucronulate, unequally or subduplicate serrate-dentate, above, especially on the nerves, puberulent, beneath more or less canescent, rarely glabrate, epunctate or somewhat pellucid-punctate, containing mucus; panicles exceeding the leaves, puberulent, the cincinni sessile, the white flowers about 4 mm. broad; sepals glabrous or puberulent; petals obovate-spatulate, sparsely and microscopically glandular within; capsule elliptic or obovate, shortly stiped, narrowly or broadly winged, subexcised apically, glabrous or puberulent without, glabrous or glandular within, the cells inflated; seeds 2–3 mm. long, ellipsoid.—In herbaria by Ruiz and Pavón as "*Paullinia dentata.*"

San Martín: *Spruce 3215* (det. Radlkofer).—Huánuco: Pozuzo, *4569; Ruiz & Pavón; Rivero.*—Junín: On sunny brush, La Merced, *5590.*—Río Acre: Seringal Auristella, *Ule 9564.* Texas and Mexico to Paraguay and Argentina.

4. CARDIOSPERMUM L.

Suffrutescent or annual with the habit and general character of *Urvillea* but the membranous or subchartaceous incompletely 3-celled fruit inflated. Lower disk glands obsolete.

Flowers 6–8 (–10) mm. long, the upper disk glands corniculate; terminal leaflets usually wider than 3 cm. . . . . *C. grandiflorum.*

Flowers 4–6 mm. long, the disk glands orbicular; terminal leaflets rarely 2.5 cm. wide.

Terminal leaflets usually distinctly petiolulate; seed hilum typically small. . . . . *C. Corindum.*

Terminal leaflets usually decurrently petiolulate if at all; seed hilum typically large. . . . . *C. Halicacabum.*

Cardiospermum Corindum L. Sp. Pl. ed. 2. 526. 1762; 397. *C. Corindum* L. forma *villosum* (Mill). Radlk. l.c. 401 fide Radlk.

Habit of *C. grandiflorum* and as variable, especially in pubescence; leaves often more or less subbipinnate or subtriternate; leaflets

ovate-lanceolate to linear, the terminal at least well-petiolulate, little larger, 4–7 cm. long, 1–2 cm. wide, all incised dentate to crenate or subentire; capsule to 4 cm. long and broad, sometimes half as large; seed of *C. grandiflorum* but only 2.5–4 mm. in diameter.—Peruvian forms are *loxense* (HBK.) Radlk., stems white lanate, leaves biternate, leaflets ovate-oblong, dentate, yellowish appressed setulose above, canescent beneath; *molle* (HBK.) Radlk., stems villous, leaves decompound, the small leaflets appressed pilose, the large fruits softly hirsute; *subsetulosum* Radlk., crisply hirtellous to subglabrous, the leaves to bipinnate, setulose on nerves and veins, fruit large and pubescent or small and glabrate; etc.—Half-shrub of drier valleys, 800–3,000 meters (Weberbauer). Standley and Steyermark, Fieldiana: Bot. 24, no. 6: 240. 1949, reduced this, perhaps correctly, to *C. Halicacabum*. Yellow and light brown mature fruits in pretty festoons among cactus and acacias of dry Pampas River plain, the most conspicuous plant March 1, 1939 (Stork & Horton).

Piura: Amotape Hills, (*Haught & Svenson 11525*).—Lima: Amancaës, *Ruiz & Pavón; Wilkes Exped.* Matucana, on slide rock, *294*.—Huánuco: Near Huánuco, on shrubbery, *2061; Ruiz & Pavón; Haenke; Stork & Horton 9380* (4 meters high on *Schinus*, det. Standley); *Soukup 2229*.—Junín: San Rafael, *2408; Sawada P 114*. Cabello, *1335*. Amazonas: Chachapoyas, *Mathews; Weberbauer 4361; 294; 1335; 2061; 2408*. Near Tupen, *Weberbauer 4784; 5467;* 155.—Arequipa: Prov. Camana, *Worth & Morrison 15642*. Mejía (*Gunther & Buchtien 258*, det. Bruns).—Apurímac: Prov. Andahuaylas, *Stork & Horton, 10661;* Río Pampas & Chincheros, *10788; 10735*. Abancay, *Soukup 759*.—Cuzco: Prov. Urubamba, *Vargas 11059*. Valley Yucay, *Herrera 1368*. Widely distributed in warm regions.

Cardiospermum grandiflorum Swartz, Prodr. 64. 1788; 372. *C. elegans* HBK. Nov. Gen. & Sp. 5: 99. *pl. 439*. 1821. *C. hispidum* HBK., l.c. 101.

Rather stout, the 5–6 costate-sulcate flowering stems about 3 mm. in diameter, early typically hirsute-tomentose as the petioles and long rachises, the biternate leaves softly pubescent beneath, or in variants all these parts subglabrous or more or less hispid; leaflets ovate, the upper lateral suboblong, the terminal subrhombic, this 7–8 cm. long, 3.5 cm. wide, with petiolule 1.5 cm. long, the upper lateral 5.5 cm. long, 2.5 cm. wide, the lower 2.5–3 cm. long, about

2 cm. wide, all petiolulate, coarsely or incised dentate, membranous, yellowish-green; sepals 4, often hispidulous, about as long as the obovate or elliptic petals (said to be 8–10 mm. long, rarely seen fully developed); upper disk glands erect, corniform; capsule chartaceous, obovate or elliptic, trigonous, acute both ends, reticulate, to 6.5 cm. long, 3.5 cm. broad, shortly stiped, pilose, setulose or subglabrous; seeds globose, 7.5 mm. in diameter, the whitish hilum, scarcely exceeding 1.5 mm., suborbicular.—The forma *hirsutum* (Willd.) Radlk. is the hirsute-setose stemmed race, (possibly distinct?) the forma *elegans* (HBK.) Radlk., (type locality simply "Peru") the nearly glabrous variant as to stems, leaves and fruit. Most of the herbarium material seen lacking flowers is placed here on the basis of leaf-character; the Williams' collections were distributed by me as *C. Corindum*, form.

Cajamarca: Tomependa, *Bonpland* (type, *C. hispidum*).—San Martín: Tarapoto, *Ule 6642; Spruce 4217; Williams 5535; 5524.* Vaco Pozo, *Woytkowski 35144; 35169* (both det. Steyermark). Morales, *Williams 5664.* Juan Guerra, *Williams 6842.* Juanjuí, *Ferreyra 4553* (f. *hirsutum*). Near Saposoa, *Ferreyra 4621.*—Junín: Chanchamayo, *Isern 2101.* La Merced, *5467* (det. Macbride, *C. Corindum*, form). Puerto Bermudez to Cahuapanas, *Killip & Smith 26703* (det. Killip). Puerto Yessup, *Killip & Smith 26301* (det. Killip).—Huánuco: Mission Tocache, *Poeppig.*—Cuzco: Alto Urubamba, *Diehl & Herrera 2490.* Without locality, *Gay.* Warm America; Africa. "Casha huasca" (Williams), "achocha-china" (Ecuador, Mexia).

Cardiospermum Halicacabum L. Sp. Pl. 366. 1753; 379.

Climbing annual herb, glabrous or minutely puberulent, the upper leaves biternate, about equaled by the slender bicirrose panicles; terminal leaflet rhombic-lanceolate, 4–8 cm. long, 1.5–2.5 cm. wide, the lateral smaller, the lower ovate, the upper oblong, obtuse or subacute both ends, or acuminate, all sessile, closely incised-dentate or obtusely lobed, sometimes parted, especially on the nerves and margins, both sides crisply or setulosely pubescent; flowers 4 mm. long, equaled by the pedicels; sepals 4, glabrous or sparsely pubescent; disk glands short; capsule subsessile, subglobose or turbinate-trigonous, 3–4 cm. long and broad, or smaller, pubescent; seeds globose, about 5 mm. thick, said to be equaled by the whitish cordiform bilobed hilum.—The var. *microcarpum* (HBK.) Blume is the plant with smaller capsules. Illustrated, Radlkofer, p. 380 from Pflanzanfam. 3, Abt. 5: 308 (fruit and flower).

San Martín: Chazuta, *Klug 3997* (det. Standley).—Huánuco: *Pozuzo, 4645*.—Junín: Colonia Perené, *Killip & Smith 25416* (det. Killip).—Loreto: Punchano near Iquitos, *Williams 1315; Killip & Smith 27341*. Iquitos, *Williams 1446; 7953*. Cachiperto, *Klug 3117* (det. Standley). Balsapuerto, *Klug 2881* (det. Standley).—Ayacucho: Kimpitiriki, *Killip & Smith 22854* (det. Killip).—Cuzco: In patio at Illapani, 700 meters, *Bües*. In all tropics and subtropics. "Baillarina" (Williams).

5. THINOUIA Tr. & Pl.

Habit of *Paullinia* or *Urvillea* but the fruit consisting of 3 seed-cells with terminal samara-like wings joined at one edge to a central axis and the nearly regular flowers notably pseudo-umbellate. Calyx 5-parted. Petals 5, the scales bifid or 2. Leaves always trifoliate, the leaflets petiolulate.

Thinouia obliqua (R. & P.) Radlk. Sitzungsb. Akad. Wiss. München 8: 282. 1878; 425. *Paullinia obliqua* R. & P. ex Klotzsch (?), Bot. Zeit. 5: 393. 1847. *T. repanda* Radlk. in Pflanzenfam. 3, Abt. 5: 308. 1895; Mart. Fl. Bras. 13, pt. 3: 456. 1897, at least as to Peru. *T. myriantha* Tr. & Pl. Ann. Sci. Nat. sér. 4. 18: 369. 1862, at least to Peru.

Nearly glabrous scandent shrub with terete lightly striate lenticellate branches, scarcely pulverulent apically; stipules minute; petioles 4–7 cm. long; terminal leaflet 8.5–10 cm. long, excluding petiolule 1–nearly 2 cm. long, rounded at base, the little smaller lateral truncate or subcordate at base, all ovate, acute, mucronulate, entire or obsoletely bi-tridentate apically (lateral more or less inequilateral), chartaceous-coriaceous, subtransversely reticulate-veined with 4 lateral nerves, these pilose in the axils beneath, otherwise glabrous both sides, containing mucus and impressed glandular punctate; panicles cirrose or ecirrose, puberulent, the pedicels medially articulate; fruit 6 cm. long, the cells rather tumid, inconspicuously reticulate-veined, 1 cm. long, 8 mm. wide, glabrous, glandular within, the wings 4 cm. long, 1.5 cm. wide at middle where broadest, constricted at base.—With flowers unknown in type, generic position doubtful (Radlkofer) but from the materials now accumulated it seems doubtful if there is any specific difference in the relative lengths of petals and petal scales. However this may be, the small petals may barely exceed the calyx but may be exceeded by the scales. F.M. Neg. 5639.

Huánuco: Pozuzo, in woods, *Ruiz & Pavón*, type.—Junín: Santa Rosa, 650 meters, *Killip & Smith 26139* (det. Killip, *T. repanda*). —San Martín: Juanjuí, *Klug 4293*. Chazuta, *Klug 4058; 4102*. —Loreto: Río Mazán, Quebrada Andrade, *José Schunke 183* (det. Standley, *T. repanda*). On the Río Ucayali, *Tessmann 3314; 3500* (det. Dahlem, *T. myriantha* vel aff. *T. obliqua*).—Ayacucho: Near Kimpitiriki, *Killip & Smith 22969*.—Cuzco: Echarate, 900 meters, *Stork, Horton & Vargas 10496* (det. Standley, *T. repanda*).

6. ALLOSANTHUS Radlk.

Scandent shrub simulating closely *Allophylus* but the regular flowers (only the male described) with 5-lobed calyx, the 5-deltoid lobes valvate and scarcely exceeding the patellate disk, this with subconvex center and elevated free margin. Petals 5 with 2 inner densely villous scales. Stamens 8, densely villous-tomentose below, exserted, the globose anthers papillose, excised at base, the pollen grains globose.—Fruit unknown but genus placed by the author in the vicinity of *Cupania* with dehiscing capsules.

Allosanthus trifoliolatus Radlk. Pflanzenreich IV. 165: 1157. 1933.

Glabrous, except the ashy-puberulent or pulverulent inflorescences, these solitary to several in the axils of the sparsely leafy 4–5 mm. thick terete branchlets; leaves trifoliolate, the petioles 4–10 cm. long, the distinct lateral petiolules about half as long as the terminal, the entire oblong-elliptic leaflets subequal, mostly about 1 dm. long, 4–5 (8) cm. wide, broadly obtuse or rounded at base, the lateral unequal, all shortly and obtusely acuminate, firm-chartaceous or subcoriaceous with 6–8 lateral nerves anastomozing before the margin, the laxly reticulate veins subprominent both sides, epidermis lacking mucus; inflorescences 6–10 cm. long, the stiped cincinni 5–9-flowered nearly to base, the pedicels 2.5 mm. long; bracts and bractlets deltoid; flowers 3 mm. wide.—Type climbing to 25 meters, the trunk diameter 4.5 cm.

San Martín: Juanjuí, *Klug 4176* (det. Sandwith, with query; distributed as *Connarus Patrisii*).—Loreto: Between Iquitos and Pongo de Manseriche (*Tessmann 4444; 4462*, type collections).

7. ALLOPHYLUS L.

Erect shrubs or small trees with normally trifoliate leaves, the lateral leaflets more or less oblique, all often pellucid-punctate or

-lineolate. Inflorescence racemiform or loosely paniculate, axillary, the small or minute flowers globose or nearly, and usually closed. Sepals 4, opposite in pairs, the outer much smaller. Petals each with a 2-lobed or bifid scale and 2–4 disk glands opposite them, the disk unilateral. Stamens usually 8; anthers short-ellipsoid, the pollen grains trigonous-placentiform. Ovary deeply bilobed, the lobes joined by the bilobed style. Fruit an obovoid-globular indehiscent coccus, the erect seed with a very short but fleshy aril. —The monographer has relied primarily on the number of inflorescence branches—or their lack—and the size of the flowers in order to group the species. The first character, particularly, is not entirely reliable or discernible, especially in undeveloped specimens.

Leaves 1-foliolate.

Younger branchlets reddish-hirtellous.....*A. amazonicus.*

Younger branchlets soon glabrous.....*A. loretensis.*

Leaves 3-foliolate.

Panicles (so far as known) consistently simple; leaves soon glabrous or essentially, except *A. semidentatus*, rarely *A. edulis*, always pellucid-punctate.

Leaflets obovate, nearly or quite half as wide as long, pubescent beneath.....*A. semidentatus.*

Leaflets about elliptic-lanceolate, often a third as wide as long.

Leaves membranous-chartaceous, hypoderma none, greenish in herbaria.

Leaflets (medial) canaliculately cuneate at base..*A. edulis.*

Leaflets all petiolulate or at least medial.....*A. punctatus.*

Leaves coriaceous in type, reddish in herbaria, and upper surface with hypodermal tissue.....*A. peruvianus.*

Panicles usually with one or more branches or rarely simple and the leaves then (in Peru) densely pubescent beneath.

Leaves soon glabrous or essentially; inflorescence branches often elongate.

Inflorescence branches often, at least some, with one or more branchlets; leaflets usually broadly obovate-elliptic, subabruptly acuminate, membranous....*A. paniculatus.*

Inflorescence branches simple; leaflets often about lanceolate or oval, firm, usually subcoriaceous unless in *A. leiophloeus.*

Rachis branches slender even in fruit, rarely 1 mm. thick, soon glabrate.....*A. leiophloeus, A. floribundus.*

Rachis branches stout even in flower, tardily glabrate.

Leaflets lanceolate, 4–6 cm. wide.....*A. scrobiculatus.*

Leaflets oval, 2–3 cm. wide.....*A. amentaceus.*

Leaves obviously pubescent especially beneath, at least the nerves with conspicuous trichomes.

Leaflets somewhat elliptic-obovate, sharply denticulate, 4–9 cm. wide; inflorescence branches elongate..*A. divaricatus.*

Leaflets nearly elliptic, crenate or dentate, 2–5 cm. wide; inflorescence branches usually short or none.

Leaves coriaceous; inflorescences usually short-branched. *A. coriaceus.*

Leaves membranous; inflorescences rarely branched. *A. densiflorus.*

Allophylus amazonicus (Mart.) Radlk. Pflanzenfam. 3, Abt. 5: 312. 1895; 480. *Schmidelia amazonica* Mart. in Flora 22: Beibl. 1: 6. 1839.

Shrub or small tree, the branchlets densely hirtellous, the older glabrate brown branches pale lenticellate-punctate; leaves 1-foliate, sometimes with stipelliform processes at juncture of the 1–2 cm. long petiole and the obovate, elliptic-oblong or sublanceolate blade, this about 1 to nearly 2 dm. long, 4–7 cm. wide, acute or subobtuse at the sessile base, shortly and obtusely acuminate, crenate-serrate, the lateral nerves about 10–15, the veins subclathrate, chartaceous, glabrous, drying brownish-green, lustrous above, containing mucus, minutely and obsoletely pellucid punctate; panicles half as long or as long as leaves, sometimes exceeding; cincinni sessile or subsessile, 3–11-flowered, the ashy-puberulent typically white flowers 2 mm. wide, the petal claw and scales barbate; fruit obovoid, subglabrous, 7 mm. long, 5 mm. thick.—The Peruvian plant, according to the monographer, is var. *angustifolia* Benth., younger branches, more slender panicles and petioles subglabrous instead of rufescent-hirtellous; panicles subequaling the leaves, the cincinni sessile, but this specimen, not seen, is probably *A. loretensis* Standley. A 7-meter tree with yellow fruits (Spruce). F.M. Neg. 5651.

Loreto: Yurimaguas, (*Spruce 3907* var., fide Radlk.). Brazil. "Parana" (Brazil).

Allophylus amentaceus Radlk. Sitzungsb. Akad. Wiss. München 38: 215. 1909; 508.

Younger branches as the petioles (5–15 mm. long) and short panicles fulvous tomentulose-puberulent, the older terete, rugulose, glabrate, densely lenticellate; middle leaflet 3.5–7 cm. long with the 1–2 mm. long petiolule, all oval, about 2–3 cm. wide, shortly acuminate, entire except for 1 or 2 teeth near the tips, fleshy rigid-coriaceous, glabrous above except for the rusty pubescent midnerve, also beneath except fulvous barbate in the axils of the 6–10 lateral nerves and a few setae on the prominently reticulate veins, brownish, subopaque, with brown hypoderma above; panicles soon glabrate, mostly geminate in the axils, 1–5 cm. long, to 3 cm. broad, the younger amentaceous, densely multiflowered; buds small, subglabrous; otherwise unknown.—Like *A. crassinervis* Radlk. of the West Indies it emits, moistened, the odor of Piperaceae. As in the case of the Pavón collection of *A. Cominia* (L.) Sw., 508, the type may have come from Guayaquil. The latter is more tomentose, the panicles rarely geminate, branched medially, often exceeding the leaves. F.M. Neg. 23617.

Peru(?): Pavón, type, Herb. Boiss.

Allophylus coriaceus Radlk. Sitzungsb. Akad. Wiss. München 38: 211. 1909; 488.

Branches 3–5 mm. thick, the terete younger as the short nearly subsessile panicles fulvous with a dense spreading tomentum, the older as the petioles (1.5–5 cm. long) and petiolules (3–6 mm. long) sordidly so, finally glabrescent, obsoletely pale lenticellate; leaflets 3, the middle one rhombic-lanceolate, cuneate at base, 4.5–13 cm. long, 3–5 cm. wide, the lateral a third smaller, obliquely ovate-lanceolate, all definitely acuminate, petiolulate, above the lower third uncinate or subcrenate-serrate, 8–14 lateral nerves, beneath densely and finely, above laxly reticulate-veined, coriaceous, the nerves above early, the veins also beneath ashy-tomentose, obsoletely punctate, lineolate-pellucid; panicles 1–3 cm. long; pedicels very short; flowers about 2 mm. wide, the sepals pilose-ciliate, sparsely appressed puberulent at base; petal claw and scales ciliate, the blade of petal sparsely; disk hirtellous; stamens except at tip densely pilose, the rudimentary ovary densely setulose. F.M. Neg. 23620.

Cajamarca: Magdalena to Contumaza, 2,500 meters, *Weberbauer 7223* (det. in herb., *A. stenodictyus*). Without data, *Ruiz & Pavón*, Herb. Boiss., type.

Allophylus densiflorus Radlk. Sitzungsb. Akad. Wiss. München 38: 211. 1909; 489.

Similar to the allied *A. coriaceus;* younger branches as petioles (1–3.5 cm. long) and peduncled panicles (1–5 cm. long) spreading or subappressed puberulent, lenticellate-lineolate; middle leaflet 5–8 cm. long, 2–3 cm. wide, on petiolule 1–3 mm. long, all elliptic-lanceolate, the upper one-third or one-half coarsely serrate, the lateral little smaller, membranous, drying green or above fuscescent, glabrous except for the sparsely puberulent nerves and veins and beneath barbate in the axils; sepal cilia glandular; petal blade subglabrous; disk glabrous.—Otherwise like the related species, and less pubescent, perhaps a variant; the panicles are sometimes a little branched; both species, with the Columbian *A. stenodictyus* Radlk., 505, are very near *A. mollis* (HBK.) Radlk., 511, with somewhat broader leaves in Colombia, the type locality. The extent of branching accepted by the monographer to distinguish these two similar shrubs certainly is not constant in development. Furthermore, these forms appear to be doubtfully distinct specifically from the more northern widely ranging *A. Cominia* (L.) Swartz, 508, with perhaps more serrulate leaflets. Radlkofer referred a specimen from Guayaquil by Pavón (or Tafalla) to this species, apparently the basis for his indication in his key, 462, of its occurrence in Peru; cf. *A. incanus* Radlk., perhaps another variant, mentioned under *A. divaricatus* Radlk. F.M. Neg. 23619.

Amazonas: Chachapoyas, *Mathews 3208,* type.—Piura: Frías, Prov. Ayavaca, 1,400 meters, *Weberbauer 6417.*

Allophylus divaricatus Radlk. in Mart. Fl. Bras. 13, pt. 3: 493. 1900; 512.

Subterete branches, terete petioles (1.5–7 cm. long) and basally divaricately 3–6-branched panicles (7–14 cm. long) densely and crisply pale-fulvous tomentose-strigillose, finally glabrate; middle leaflet broadly elliptic-lanceolate and slightly obovate with 2–8 mm. long petiolule, 8–19 cm. long, 4–9 cm. wide, the lateral a third smaller, subsessile, oblique, all nearly to the base acutely, closely and rather coarsely somewhat double serrate, herbaceous, drying brownish-green above, lustrous and sparsely puberulent unless on the nerves, pale green and densely ashy-hirtellous beneath, especially on the 12–20 approximate oblique nerves and the densely clathrate veins, obsoletely and very minutely pellucid-punctate; flowers white, many, crowded, only about 1 mm. broad; sepals

pilose and glandular-ciliate, the petal claw and scales barbate; disk pubescent; style subglabrous.—The related *A. incanus* Radlk., 513, of Ecuador has spreading panicle branches, merely subcrenate leaves, the younger ashy subsericeous, all petiolulate, the middle petiolule to 1 cm. long while the rather similar *A. cinnamomeus* Radlk., 513, of Bolivia, with reddish-brown tomentum, subsessile unequally and sharply serrulate leaflets, has yellowish flowers notably about 3 mm. broad. Shrub or 8-meter tree (Spruce) with straight trunk to 3 dm. in diameter; common in thickets on the plain of Tarapoto (Williams). F.M. Neg. 5653.

San Martín: Near Río Mayo, *Spruce 4389*. Near Tarapoto, *Ule 6639; Williams 5969; 6033; 6137*.—Junín: La Merced, Chanchamayo Valley, 1,000 meters, *Weberbauer 1925;* 282.—Loreto: Río Putumayo, *Klug 2364* (det. Standley). Brazil; Ecuador. "Yurac-tortilla-caspi" (Williams).

Allophylus edulis (Camb.) Radlk. in Warming, Symb. pt. 37: 995. 1890 (Vid. Medd. Kjoeb. 1890; 244) 493. *Schmidelia edulis* Camb. in St. Hil. Fl. Bras. 1: 381. 1827.

Usually nearly glabrous shrub or small tree, the rather slender branches strict, the younger somewhat hirtellous ones densely foliate, short, angulate, with many pallid lineolate lenticels, the older ashy or reddish-brown, glabrate, the lenticels verruculose; petioles mostly dilated apically, 3–5 cm. long, the middle leaflet often 8–10 cm. long, 2.5–3 cm. wide, sometimes larger or smaller, basally long-cuneate but subsessile, medially serrate, all conspicuously acuminate, the lateral sessile, little smaller, more or less oblique, lateral nerves 8–14, membranous-chartaceous, glabrous or the younger especially on the nerves pubescent, often barbate in the axils, lustrous and lucidulous above, at least early pellucid-punctate, hypoderma none; panicles crowded at the base of the younger branches, terminally and laterally, usually long-peduncled, laxly flowered, glabrous or minutely puberulent, the cincinni sessile or stiped; flowers about 2 mm. broad, yellowish-white, the sepals glabrous except the glandular-ciliolate margins, the petals on margins little, on scales densely barbate; disk puberulent; ovary glabrous or rarely sparsely puberulent; fruits red, drying black, to 8 mm. long, obovoid, glabrous, edible.—Illustrated, St. Hil., Juss., et Camb. Pl. Us. *pl. 67* (1828, not 1824, fide Radlk. which makes the Camb. citation l.c. above correct).

Río Acre: Seringal San Francisco, *Ule 9569*. Brazil to Paraguay, Bolivia and Guiana.

Allophylus leiophloeus Radlk. Sitzungsb. Akad. Wiss. München 38: 214. 1909; 503.

Slender tree, the strict terete lenticellate branches early puberulent, finally glabrescent as also the petioles (3–6.5 cm. long), equally long usually bi-branched panicles and leaves beneath; middle leaflet obovate-lanceolate, cuneate at base to petiolule 2–3 mm. long, the lateral a third smaller, elliptic-lanceolate, subsessile, oblique at acutish base, all acutely acuminate, remotely and coarsely serrulate above the middle, membranous, glabrous above except for the 7–12 lateral nerves, densely and finely reticulate-veined, nitidulous both sides, obsoletely pellucid-punctate; pedicels nearly 2 mm. long; flowers about 2 mm. broad, white, the sepals nearly glabrous except the pilose and glandular-ciliolate margins, the petal scales and claw densely barbate, the petal blade sparsely ciliolate, the scale lobes ligulate; disk subglabrous; fruit not known.—Apparently a state of *A. floribundus* and all of the collections from San Martín cited under that name probably belong here if *A. leiophloeus* is valid. Allied by the author to *A. petiolulatus* Radlk., 501, widely distributed in Brazil and known from Bolivia, with leaflets typically long-petiolulate, leaflets barbate in nerve axils beneath; there are other minor differences but the Bolivian plants seem to be intermediate and probably there is only a single species. These named forms center around *A. glabratus* (HBK.) Radlk. of Colombia. Five to 7 meters tall (Spruce).

San Martín: Tarapoto, *Spruce 4482*, type. Juan Guerra, *Ule 6615* (det. Radlk.).

Allophylus floribundus (Poepp. & Endl.) Radlk. Pflanzenfam. 3, Abt. 5: 312. 1895; 502. *Schmidelia floribunda* Poepp. & Endl. Nov. Gen. & Sp. 3: 38. 1844.

Much branched, densely leafy tree, the older branches glabrate, cinerescent, the younger as the panicles sparsely puberulent, the latter crowded apically, and usually with 1–3 basal branches about as long as the leaves, many-flowered, the pedicels glabrous and only about 1.5 mm. long; petioles complanate above, 1–2 cm. long; middle leaflet 8.5–15 cm. long, 2–4 (6) cm. wide, lanceolate as the little smaller or oblique lateral ones, all shortly and mucronulately subfalcate acuminate, shortly petiolulate, remotely and subrepandly uncinulate-serrulate on the upper half, rigid chartaceous, somewhat lustrous above, subopaque below, obsoletely punctate-lineolate pellucid, glabrous except barbate in the 6–12 distant lateral nerve

axils beneath, where especially densely reticulate-veined; flowers about 1.5 mm. broad; sepals glabrous except the ciliolate margins; petal claws and scales densely barbate; disk nearly glabrous; young fruits sparsely puberulent, obovoid-globose.—The San Martín material probably is referable to *A. leiophloeus* Radlk. if that is separable. Loreto determinations by Standley. Small tree 4–11 meters tall with open crown, slender cylindrical trunk, the grayish-brown bark with many small fissures (Williams). F.M. Neg. 31032.

Huánuco: In woods at Cuchero, *Poeppig 1480*, type.—Junín: Chanchamayo Valley, 700 meters, *Weberbauer 1831; 1947;* 282. La Merced, *5249; Killip & Smith 23503; 24062.* San Ramón, *Killip & Smith 24890.* Colonia Perené, *Killip & Smith 25040; 25041.* San Martín: Tarapoto, *Ule 6592* (det. Radlkofer); *Williams 5453; 6020; 6596; 6791.* Juanjuí, *Klug 3823* (det. Standley). Bellavista, *Ferreyra 4734.* San Roque, *Williams 7001; 7007; 7239.* Chazuta, *Klug 3879* (det. Standley). Lamas, *Williams 6405; 6412.* —Loreto: Yurimaguas, *Williams 4131.* Pumayacu, *Klug 3155.* Balsapuerto, *Klug 3033; 3043.* Florida, Río Putumayo, *Klug 2055; 2302.* "Shitari-caspi" (Williams).

Allophylus loretensis Standley, sp. nov. in herb. *A. amazonicus* (Mart.) Radlk., var. *angustifolius* Benth. ex Radlk. Pflanzenreich IV. 165: 481. 1932?

A. amazonico arcte affinis; insignis ramis junioribus thyrsis et petiolis subglabris; petalis ad unguem et ad squamam leviter barbatis; cincinnis sessilibus.—Type *Klug 3103.* These differences, slight indeed, seem to be constant; furthermore, the inflorescences are very slender, nearly glabrous, sometimes almost as long as the leaves, these usually drying gray-green, and the open flowers are scarcely 1.5 mm. wide; fruits (*Killip & Smith 26801*) rather coarsely venose, little narrowed to base, about 8 mm. long. It seems probable that *Spruce 3907* included by Radlkofer in the variety of Bentham (compare *A. amazonicus*) belongs here if Standley's 4–6 meter tree or shrub proves with more collections to be specifically distinct. As usual the author has not indicated his own idea of relationship and it may be questionable courtesy to adopt his unpublished name (as for that matter often in other cases) but here too the material has been generally distributed so that convenience calls for the use of this name.

San Martín: Chazuta, Río Huallaga, *Klug 4001* (det. Standley). —Junín: Cahuapanas on Río Pichis, *Killip & Smith 26801* (Killip, *A. paniculatus*).—Loreto: Balsapuerto, *Klug 3103*, type. Brazil?

Allophylus paniculatus (Poepp. & Endl.) Radlk. Pflanzenfam. 3, Abt. 5: 312. 1895; 514. *Schmidelia paniculata* Poepp. & Endl. Nov. Gen. & Sp. 3: 38. 1844.

A rather tall subglabrous tree often 10–12 meters tall, the new branches as the panicles sparsely ashy-puberulent, the former terete in age, glabrous, the latter paniculate with many mostly branched branches; petioles to 1.5 dm. long, semiterete, broadly complanate above, dilated at tip, the middle petiolule to 2 cm. long, its obovate-elliptic leaflet to 2.5 dm. long, 1 dm. wide; lateral leaflets a third smaller, scarcely oblique, all well-acuminate, acutely petiolulate, the upper half remotely and subrepandly serrulate, at maturity chartaceous-membranous, drying brown, nitidulous, densely and obsoletely pellucid-punctate, glabrous, early puberulent on the 10 distant arcuate-ascending nerves, the veins loosely clathrate and densely reticulate; panicles subequaling the petioles, laxly many-flowered, the cincinni sessile, the pedicels 1 mm. long; flowers about 2 mm. broad, usually white, the sepals glabrous except for pilose-ciliate-glandular margins, the petal claw, scales and margins ciliate; disk subglabrous; style glabrous. Flowers white or cream-colored (Mexia). F.M. Neg. 31033.

Huánuco: Cuchero and Pampayacu, *Poeppig*, type. Rocky forested slope above Cayumba, *Mexia 8321* (det. Standley, *A. peruvianus*). Río Cayumba, *Mexia 8263* (det. Standley, *A. peruvianus*).—San Martín: Pongo de Cainarachi, *Klug 2731*.

Allophylus peruvianus Radlk. in Mart. Fl. Bras. 13, pt. 3: 488. 1900; 497.

Like *A. punctatus* but (as to type) the stouter branches more coarsely lenticellate, petioles 2–10 cm. long, the leaflets lanceolate, cuspidate, coarsely serrate the upper two-thirds, in type rigid coriaceous, glabrous, the younger nitidulous beneath, drying reddish-brown, hypodermatic above; sepals (on fruits) glabrate, ciliate.—Species of doubtful validity; Radlkofer himself, l.c. 497, observed that there is in Herb. Boiss. a specimen by Pavón intermediate between these named forms. The Madrid type is distinctly punctate against a strong light. F.M. Neg. 5659.

Huánuco: Chinchao, *Sawada 89*. Without locality, *Ruiz & Pavón*, type.

Allophylus punctatus (Poepp. & Endl.) Radlk. Pflanzenfam. 3, Abt. 5: 312. 1895; 496. *Schmidelia punctata* Poepp. & Endl. Nov. Gen. & Sp. 3: 38. *pl. 244*. 1844.

Small tree, the younger branches appressed yellowish puberulent, soon glabrate, pale lenticellate, the older cinerescent; petioles subterete, dilated at tip, 2.5–6.5 cm. long, the middle petiolule 3–8 mm. long, the leaflets 8–20 cm. long or longer, 2.5–8 cm. wide, elliptic-oblong or broadly lanceolate, the lateral similar or half as large, somewhat oblique and often subfalcately incurved, all acuminate, the upper half obsoletely or coarsely serrate (or subentire), membranous-chartaceous, subopaque both sides, green or drying brownish, more or less conspicuously pellucid-punctate and lineolate; hypoderma none, epidermis containing merely traces of mucus, glabrous unless for barbate nerve axils beneath the lateral nerves 8–15, venation subclathrate; panicles solitary or many, mostly exceeding the petioles, laxly flowered, canescent or glabrous, the cincinni subsessile, many-flowered, the pedicels 1–2 mm. long; flowers whitish, 2 mm. broad, the sepals pilose and glandular-ciliate, the scales and petals densely ciliate-barbate; disk glabrous (type) or pubescent; stamens glabrous or pilose below; fruits to 9 mm. long, 8 mm. thick, orange or red.—This seems to be very near *A. edulis* (Camb.) Radlk.

Huánuco: Tocache, *Poeppig 1853*, type; *2395*. Monzón, *Weberbauer 3485;* 284.—San Martín: Tarapoto, *Spruce 4413; 4460; Williams 5556; 5716; 5731; 5864; 6103; 6249; 6302* (det. Standley, *A. scrobiculatus*). Bellavista to Moyobamba, *Ferreyra 4825*.—Ayacucho: Río Apurímac Valley near Kimpitiriki, *Killip & Smith 22983*.—Loreto: Yurimaguas, *Killip & Smith 29036* (distrib. as *A. scrobiculatus*); *Williams 4457*. Florida, Río Putumayo, *Klug 2031* (det. Standley).—Río Acre: Near mouth of Río Macauhán, *Krukoff 5286; 5427*. Bolivia; Ecuador; Brazil.

Allophylus scrobiculatus (Poepp. & Endl.) Radlk. Pflanzenfam. 3, Abt. 5: 312. 1895; 504. *Schmidelia scrobiculata* Poepp. & Endl. Nov. Gen. & Sp. 3: 37. *pl. 244*. 1844.

Tree typically with lenticellate branches, ashy-puberulent especially at the nodes and ashy-puberulent mostly nodding panicles usually with 1–4 branches and longer than the petioles, these subterete, 3–5.5 cm. long; middle leaflet with exarate petiolule 3–5.5 mm. long, lanceolate, about 1–1.5 dm. long, 4–6.5 cm. wide, the lateral little smaller, little oblique, all obtusish acuminate, acutely and shortly petiolulate, remotely and repandly uncinate-denticulate above the lower third, firm-chartaceous, drying brown above, paler brownish-green and subopaque beneath, minutely pellucid-punctu-

late, glabrous unless barbate in the axils of the 8–12 arcuate-ascending nerves beneath where subclathrate and finely reticulate-veined; pedicels short; sepals minutely pilose and glandular-ciliate (or glabrate); petal claw densely (as scales), blade sparsely, ciliate; disk glabrous; fruits about 5 cm. long, 4 mm. thick, slightly ashy-puberulent as the style.—Some of the material placed here has nearly smooth branchlets, subglabrous sepals, while *Woytkowski 507* is further marked by almost hirsute branchlet tips. Type from a tall tree with grayish bark and hard white wood. F.M. Neg. 5660.

Huánuco: Fundo San Ricardo, Divisoria, 1,700 meters, *Woytkowski 507?*—San Martín: Tarapoto, *Williams 6712.*—Loreto: In woods at Yurimaguas, *Poeppig 2451,* type; *2284.* Santa Rosa below Yurimaguas, *Killip & Smith 28954* (det. Standley). Lower Río Nanay, *Williams 544; 567.* Iquitos, *Williams 7903* (det. Standley). Pebas, *Williams 1763.* Florida, Río Putumayo, *Klug 2171.* "Jimuiequirey" (Huitoto, Klug), "shimbillo," "parinari," "quinilla colorada" (all Williams).

Allophylus semidentatus (Miq.) Radlk. in Pflanzenfam. 3, Abt. 5: 312. 1895; 486. *Schmidelia semidentata* Miq. Linnaea 22: 798. 1849.

Slender-stemmed shrub, the 2–3 mm. thick branches, panicles and petioles, these 2.5–8 cm. long, early spreading pubescent with soft trichomes, finally glabrate or sparsely persisting especially beneath on the large trifoliate leaves; intermediate leaflets obovate, 8–20 cm. long, nearly half as wide on petiolules 1–5 mm. long, the lateral little shorter, inequilaterally obovate-lanceolate, all notably acuminate and above the middle coarsely and unequally serrate, densely pellucid-punctate, containing mucus; panicles slender, simple, 1.5–10 cm. long, the peduncles 0.5–3.5 cm. long; flowers 2 mm. wide, the puberulent sepals glabrous within equaled by the white sparsely ciliolate petals with densely barbate scales, the disk as ovary hirsute, the style subglabrous, the stamens pilosulous below.—The typical form (known to me only from photograph) is to be expected in the adjacent Department of Madre de Dios. Standley, without indication of relationship, has designated the Klug collection as an undescribed species which it may prove to be but as I hesitate to give him responsibility, since ex char. it seems too near *A. semidentatus,* I propose it myself as merely a variant using, however, the apt name under which it was distributed as a species: var. **pilosus** Macbr., var. nov., ut videtur similis *A. semidentato* sed

differt foliolis papyraceo-membranaceis paullo pellucido-punctatis et ramulis petiolisque conspicue pilosis. F.M. Neg. 21349.

San Martín: Juanjuí, 6-meter tree, *Klug 3783* (type, var. *pilosus*). —Río Acre: Seringal Guanabara, Alto Xapuri, *Ule 9570*. To eastern Brazil.

8. SAPINDUS [Plum.] L.

Trees with exstipulate mostly abruptly pinnate leaves and large terminal divaricately branched panicles of small minutely bracted and bracteolate obliquely symmetric flowers, the sepals and petals in the Peruvian species both 5, the stamens exserted, the fruits smooth drupes.

Sapindus saponaria L. Sp. Pl. 367. 1753; 639. *S. peruvianus* Walp. Nov. Act. Acad. Leop.-Carol. 19: Suppl. 1: 312. 1843.

A small nearly glabrous tree with abruptly pinnate leaves, these with 3–6 pairs of oblong-elliptic-lanceolate oblique subsessile acute leaflets, the rachis and petiole more or less wing-margined, entire, membranous, pale green, glabrous or softly pubescent; upper petioles 2–7 cm. long, rachis segments 2–5 cm. long, the wings 2–6 mm. wide, petiolules 2–3 mm. long, the leaflets about 7–12 cm. long or longer, 3–5 cm. wide; sepals glabrous except at the base and the ciliolate margins; petals 3 mm. long, scarcely half as wide, ciliate, sublobulate or squamate and villous above the claw; stamens exserted, villous at base; disk complete, fleshy, cupulate, glabrous; fruit usually with only one cell, yellowish, glabrous, globose as the seed, 1.5–2 cm. in diameter.—According to Weberbauer it is found mostly under 1,500 meters in the dry hot interandine valleys, chiefly on the western slope. Illustrated, Radlkofer, l.c. page 645; Ruiz & Pavón, Fl. Peruv. 4: *pl. 342* and many others.

The fruits with which the children play are called cholocos and bolillos (Ruiz & Pavón); the whitish pulp that surrounds the seed contains saponin which foams or "suds" with water and is commonly used as soap, for instance to wash baize cloth (Ruiz & Pavón); the wood and roots, astringent, are said to be tonic.

Lima: Surco, Huara and Lima, *Ruiz & Pavón*. Loma Zone, Weberbauer, 148 and 150. Along streams, *Weberbauer*, 155; 162. —Ancash: Santa Valley near Caraz, *Weberbauer*, 172. Caracha, 1,200 meters, *Weberbauer 2649*.—Huánuco: Roadside tree, *3536*. San Martín: Riverbank, Juanjuí, *Klug 4285*.—Apurímac: Abancay, *Vargas*. Río Pachachaca bank, *Goodspeed Exped. 10534*.—Cuzco:

Prov. de Convención (*Herrera*). Quillabamba, *Soukup 135*.—Tacna: (*Woitschach*). Warmer America; Africa; Oceanic Asia. "Sullucu," "jabonera," "cholocos," "jaboncillos" and "bolillos" (the fruits).

9. TOULICIA Aublet

Trees or tree-like shrubs with exstipulate mostly abruptly pinnate leaves and large subterminal sparsely branched panicles of rather small nearly symmetric flowers, these in the Peruvian with only 4 petals, deeply bifid scales, unilateral disk. Fruit about as in *Serjania* or in Peru the cells subinflated.—In flower simulates *Talisia* in part but the rounded tomentulose sepals are a distinguishing character.

Toulicia reticulata Radlk. Notizbl. Bot. Gart. Berlin 6. 154. 1914; 622.

Petioles (about 4 cm. long), subterete rachises and leaflets beneath as well as the laxly branched panicles even to the orbicular sepals without softly rusty or yellowish tomentose; leaflets about 10 pairs, the lower short-ovate, about 6 cm. long, 4 cm. wide, opposite, the upper with petiolule 5–10 mm. long, to 25 cm. long, 9 cm. wide, alternate, elliptic to broadly oblong, strongly oblique, shortly obtuse-acuminate, acute at base, entire, subrevolute, rigid coriaceous, glabrous and prominently reticulate above, the oblique lateral nerves conspicuous beneath, epunctate, the epidermis lacking mucus; flowers subsessile, 4 mm. across; disk glabrous; petals villous, the scales filiform appendaged; fruit cells with wings 3–4 cm. long, the former 12–14 mm. wide.—Related Amazonian species are *T. elliptica* Radlk., 622, and *T. bullata* Radlk., 623, both with pubescent disk, the former with glabrous alternate leaflets, those of the latter subopposite, bullate, minutely pubescent beneath. To 30 meters tall. F.M. Neg. 5668.

Loreto: Cachipuerto between Balsapuerto and Moyobamba, *Klug 3127* (det. Standley).—Río Acre: Seringal Auristella, *Ule 9566*, type; *9567*. Mouth of Río Macauhán, *Krukoff 5247; 5560*. Brazil.

10. POROCYSTIS Radlk.

Glabrous tree with subterete branches, exstipulate abruptly pinnate leaves (petiolules and rachis obscurely sulcate) and terminal or axillary panicles of white 4-petaled flowers borne on lateral branchlets. Sepals 5, imbricate, concave, the 2 outer smaller.

Petals ovate, unguiculate, sericeous without with barbate bifid scale within. Disk unilateral, tomentose. Stamens 8, filaments exserted, villous. Ovary 3-celled, tomentose. Fruit consisting of 3 membranous inflated cocci cohering centrally and crowned by the 3-parted indurated style.

Porocystis toulicioides Radlk. Sitzungsb. Wiss. München Akad. 8: 354. 1878; 630.

Small tree, the trunk diameter (known) to only 8 cm.; flowering branches to 1 cm. in diameter; petioles enlarged at base; leaves 3–4.5 dm. long with 7–12 alternate or subopposite oblong or elliptic subequilateral leaflets 1.5–2.5 dm. long, 4.5–10 cm. wide with about 10 divaricate nerves anastomosing before the entire margins; panicles equaling the leaves, on slender subflexuose branchlets, puberulent; dichasia glomeruliform 5–11-flowered, the short pedicels articulate below the middle, the pubescent bracts and bractlets small; flowers scarcely wider than 3 mm.; sepals all appressed pubescent, the petaloid inner with glabrous margins; fruits about 2 cm. high, 3–4 cm. wide, the subglobose seeds about 8 mm. thick.—Simulates *Toulicia guianensis* Aublet with deeply sulcate branches and compressed petioles. Since it is known in the area of Solimoes, Brazil, it probably extends into Amazonian Peru. Illustrated, Radlkofer, l.c. 628 (flowers, fruit, ex Pflanzenfam.) et Mart. Fl. Bras. 13, pt. 3: *pl. 108.*

Peru (probably; cf. note above). Amazonian Brazil; British Guiana.

11. TALISIA Aublet

Acladodea R. & P. Prodr. 133. *pl. 29.* 1794, ed. 2. 121. 1797.

Shrubs or trees, often sparsely branched and the leaves crowded at the tips. Leaves exstipulate, abruptly pinnate, the petioles often tumid at base, the rachises subterete or subtrigonous. Inflorescence various, the flowers rather small with 5 sepals and petals, the disk annulate or cucullate. Stamens 8 or 5. Fruit baccate, granulate, ovoid or ellipsoid, rather large, mostly 1-celled and 1-seeded, the ovary, however, 3-celled, attenuate into a subulate style.—Some herbarium material may be confused with the genus *Picramnia* of the Simaroubaceae.

Leaves pinnately trifoliolate..... *T. peruviana.*
Leaves pinnate, multifoliolate.

Leaflets pubescent beneath, sublinear; calyx medially parted, persisting..... *T. pinnata.*

Leaflets glabrous, suboblong or elliptic.

Calyx medially parted, persisting; stamens glabrous. *T. cupularis.*

Calyx deeply parted, deciduous: stamens hirtellous. *T. cerasina.*

Talisia cerasina (Benth.) Radlk. Sitzungsb. Akad. Wiss. München 8: 347. 1878; 845. *Sapindus cerasinus* Benth. in Hook. Journ. Bot. Misc. 3: 197. 1851. *S. oblongus* Benth. l.c. 198.

Small tree or shrub, glabrous except for the ample terminal panicles, these more or less densely ashy-puberulent or white, pyramidal with many erect or spreading branches and usually longer than the leaves; branches stout, terete, lustrous; petioles 2–15 cm. long, the basally enlarged petiolules 2–10 mm. long, both as the rachis subterete or early bisulcate; leaflets 3–8 pairs, opposite or subalternate, oblong, the lower suboblique, all abruptly short-attenuate at the base, acutely acuminate, 4–24 cm. long, 1 longer, 1.5–8 cm. wide, subcoriaceous, lustrous at least above, drying green or brownish, the 7–25 anastomosing lateral nerves prominent on both sides; panicles to several dm. long and broad, the pedicels to 3 mm. long; flowers white or yellowish, 7–8 mm. long; calyx parted nearly to base, more or less puberulent, glabrous within, the ovate obtuse or rounded lobes ciliate, a third or a quarter as long as the erect linear-oblong petals, these glabrous without except ciliate below, and within as the scales densely fulvous villous, the latter shortly bifid and as long; disk tumid, cupulate, shortly hirtellous above; stamens 8, hirtellous, anthers linear-oblong, cordate at base; fruit edible, cerasiform, minutely granulose, yellowish subsericeous, apiculate.—Attains 5–10 meters (Ule). *T. obovata* A. C. Smith, Brittonia 2: 154. 1936, of Bolivia and adjacent Brazil has only two pairs of obovate leaflets 12–25 cm. long, 7–12 cm. wide, stamens 5, the disk glabrous. Some of the flowering collections may be incorrectly determined. The Burgos specimen from a tree to 30 meters tall, wood used for construction.

The leaves are said to furnish a black dye and a remedy for gonorrhea.

Huánuco: Tingo María, *Burgos* (or affine, Standley).—San Martín: Juanjuí, *Klug 4303* (det. Standley).—Loreto: Yurimaguas,

Poeppig; Klug 2798 (det. Standley). Río Mazán, *Williams 8141*. Gamitanacocha, Río Mazán, *José Schunke 303*. Mishuyacu near Iquitos, *Klug 248; 389; 811; 1044; 1160; 1558; 2509* (this last number det. Standley). Iquitos, *Killip & Smith 27024*.—Río Acre: Seringal San Francisco, *Ule 9517*. Brazil. "Pitomba" (Spruce); "juapina" (Burgos).

Talisia cupularis Radlk. Sitzungsb. Akad. Wiss. München 8: 350. 1878; 852.

Tree, glabrous except for the large robust broadly pyramidal panicles, these sometimes 0.5 meter long, 4 dm. wide, canescent with a short velvety indument; branches terete, papillose-punctate, 4–8 mm. thick; petioles bulbous above the base, terete; leaflets 3–8 pairs, opposite or subalternate, elliptic-oblong, somewhat acuminate, attenuate at base into bulbously thickened petiolules 2–5 mm. long, the 7–12 lateral nerves anastomosing before the margin and with the laxly reticulate veins rather prominent beneath, coriaceous, drying brownish; bracts rigid; pedicels 2–3 mm. long; flowers white, 6–7 mm. long, the calyx parted to the middle, densely puberulent within, the broadly ovate obtuse lobes closely ciliolate, the twice as long oblong petals ciliate below, glabrous, eglandular, equaled by the lingulate entire erect scales, these densely villous within; disk hirsute, cupulate, sinuate-pentagonous; stamens glabrous; fruit ovoid, yellowish-pubescent as the rather long style, the persisting calyx appressed-cupulate.—The Krukoff specimen from a tree 30 meters tall; vegetatively scarcely distinguishable from *T. cerasina*. Illustrated, Mart. Fl. Bras. 13, pt. 3. *pl. 113*.

Río Acre: Mouth of the Río Macauhán, *Krukoff 5725; 5630; 5787*. Amazonian Brazil.

Talisia peruviana Standl. Field Mus. Bot. 11: 165. 1936.

Shrub or small tree 2.5–6 meters high, the slender subterete branchlets minutely strigillose; leaves alternate, pinnately 3-foliolate, slender-petioled, the leaflets shortly petiolulate (to 5 mm.), oblong-elliptic, lanceolate-oblong, or obovate, 5.5–18 cm. long, 2–8 cm. wide, subabrupt-acuminate or often long-cuspidate-acuminate, acute or cuneate at base, glabrous, minutely and densely pellucid-punctate, membranous; inflorescence racemiform, half as long as leaves, few-flowered, pedicels 2–3 mm. long, densely strigillose, little elongate in fruit, bracts minute; sepals 1.5 mm. long, obtuse, sericeous; petals cuneate-obovate, 2 mm. long; disk thick, glabrous; ovary

2-celled, strigillose; styles bifid to base, the branches short; fruit broadly oval, to 2 cm. long, yellowish-green, rounded both ends or somewhat narrowed at tip and obtusely tubercled, 2-celled; seeds large, solitary in each cell.—Near to *T. japurensis* (C. DC.) Radlk.? Generic position uncertain, ovary of *Talisia* said to be early 3-celled.

San Martín: Tarapoto, *Williams 5745*, type; *6652; 6578; 6208.* Pongo de Cainarachi, *Klug 2713.* Loreto: Puerto Arturo, *Williams 5218; 5118; 5303; Killip & Smith 27915; 27874.* Yurimaguas, *Killip & Smith 27645; 27673; 27636.* Balsapuerto, *Killip & Smith 28549; 28484; 28627.* Santa Rosa, *Killip & Smith 28857.* "Sinca zanango" (Klug).

Talisia pinnata (R. & P.) Radlk. Sitzungsb. Akad. Wiss. München 8: 351. 1878; 856. *Acladodea pinnata* R. & P. Syst. Veg. 262. 1798. *Talisia acladodes* Spreng. Syst. 2: 223. 1825.

A small unbranched tree, the stem crowned apically by the crowded pinnate leaves and ample rusty tomentose panicles of whitish flowers; petioles to more than 2 dm. long, tomentose, enlarged above the base to 5 mm. thick, the multifoliolate leaves even to 1 meter long, 2.5–4 dm. wide; petiolules 2–4 mm. long, the long rachis like the petiole terete and striate, the leaflets alternate, oblong-linear, obliquely subacute at base, acuminate, 1–2.5 dm. long, 2.5–5 cm. wide, glabrous and lustrous above, bullate toward the margins, membranous, drying brown, softly pubescent beneath, especially on the prominent reticulate veins and many approximate nerves; panicles about 3 dm. long, pyramidal, much branched, with many minutely pinnate bractlike leaves; pedicels scarcely 2 mm. long; flowers nearly 7 mm. long, the calyx medially divided, densely reddish tomentose, the obtuse broadly ovate lobes ciliate, half as long as the broadly ovate petals, reflexed, ciliate below, medially below the tip fulvous tomentose, the tomentose erect shortly bifid scales as long; disk cupulate, very hirsute above as the filaments, the linear-oblong anthers cuspidate. F.M. Neg. 23636.

Huánuco: In woods at Chacahuassi near Pillao, *Ruiz & Pavón*, type.

12. DILODENDRON Radlk.

Tree or shrub allied to *Cupania* but the large leaves abruptly bipinnate, the 3–4, rarely 5 petals (or lacking in male flowers) esquamate, the sublobate concave disk glabrous. Seeds with short basal cupulate aril. The shrub is leafless when in flower.

Dilodendron bipinnatum Radlk. Sitzungsb. Akad. Wiss. München 8: 357. 1878; 1067.

Petioles and rachises obtusely triangular-sulcate, early hirtellous, the 3–7 pairs of alternate or subopposite oblong pinnae reduced toward the base, each with 4–9 pairs of oblong-lanceolate subsessile acute more or less serrate leaflets 4–6 cm. long, 1–2 cm. wide, many-nerved, smooth and glabrous above, minutely tuberculate-papillose, hirtellous, stipitate glandular, opaque and glaucescent beneath, minutely pellucid-punctate, containing mucus; panicles at tips of defoliate branches or fasciculate on new branches above axillary scales, flavescent-tomentulose, sometimes paniculate, 8–25 cm. long; bracts and bractlets small; pedicels short, articulate at base; male flowers with glabrous filaments, glabrate anthers, 3 mm. long, the female 5 mm. long, the anthers glandular-setulose; capsule elliptic-trigonous, 3-valved, 1.5 cm. long and broad, glabrous, within hirsutulous.—Sometimes 10 meters tall or taller. Illustrated, Radlkofer, l.c. 1066.

The seeds are said to provide an oil used for light and for food. The rather soft wood has an unpleasant odor.

Cuzco: Prov. Convención, Santa Ana, 1,100–1,300 meters, *Weberbauer 5020; 5043; 5044;* 277; 316. Bolivia; Paraguay; Brazil.

13. CUPANIA [Plum.] L.

Trees or tall shrubs with terete more or less sulcate and lenticellate branches that are sparsely leafy with exstipulate actually but not always clearly abruptly pinnate leaves that often exceed the panicles or small regular flowers. Sepals free, 5, imbricate in 2 rows, usually fleshy or subcoriaceous, mostly subequaling or a little longer than the petals. Disk regular, annulate. Stamens of male flowers exserted, 8 (–10). Fruit a capsule, trigonous to somewhat 3-lobed, dehiscing by 3 (2–4) lobes each provided with one ellipsoid or obovoid seed more or less enclosed by the fleshy aril.

Capsules turbinate-triangular, shortly stiped; leaflets hirtellous or tomentulose.

Leaflets papillose between the veins and hirtellous. *C. papillosa, C. latifolia.*

Leaflets tomentose beneath and epapillose. . . . . *C. cinerea.*

Capsules turbinate, more or less 3-cornute, long (3–6 mm.) -stiped; leaflets glabrescent. . . . . *C. scrobiculata.*

Cupania cinerea Poepp. & Endl. Nov. Gen. & Sp. 3: 38. 1844; 1031.

Younger branches puberulent; petioles 2–5 cm. long; leaflets 6–10, petiolulate, alternate, obovate-oblong, acute at base, obtuse or subtruncate, 5–15 cm. long, 2–5 cm. wide, repand, serrate, coriaceous, discolored, brownish above, more or less cinereous with a minute and close puberulence beneath especially on nerves and veins, epapillose, subeglandular, usually lustrous and with hypoderma above; panicles equaling or exceeding the leaves, minutely tomentulose including the oval 2.5 mm. long sepals, disk and turbinate-triangular capsule, this densely tomentose within, 1.5 cm. long; cymules sessile, the bracts and bractlets 2–3 mm. long, the pedicels 1–2 mm. long; petals white, brownish within (Woytkowski), 2 mm. long, nearly glabrous, the scales a third as long, laxly pubescent; stamens pilose near base.—*C. polyodonta* Radlk., 1030, of Ecuador has 4–6 hirtellous-puberulent leaflets. There are a number of species known from Colombia and northern Brazil to Venezuela that of course, may be found within Amazonian Peru. Determinations mostly by Standley. F.M. Neg. 31044.

Often about 10 meters tall, beautiful (Poeppig), or nearly 20 meters with straight round chocolate-brown barked trunk 2 dm. or more in diameter, the crown spreading (Williams).

San Martín: Tarapoto, *Spruce 4412; Williams 6023; Woytkowski 35078*. San Roque, *Williams 7304*.—Loreto: Yurimaguas, in margin of woods, *Poeppig 3096; Diar. 2338*, type; *Klug 2795*. Florida, *Klug 2102; 2335*. Río Mazán, *José Schunke 345*. Bolivia; Colombia. "Sama" (Herzog), "puca yacu," "huapina" (Williams), "fuapina" (Woytkowski), "sama" (Bolivia, Herzog).

Cupania latifolia HBK. Nov. Gen. & Sp. 5: 126. 1821; 1030.

Younger branches terete, puberulent, soon glabrescent and lenticellate; leaves ample, often 3–4 dm. long with 5–6 mostly alternate leaflets, the upper obovate, the remaining obovate-oblong, all emarginate, retuse, subcuneate at base, remotely and equally serrate, more or less petiolulate, 8–20 cm. long, 4.5–5 cm. wide, coriaceous, obscurely subclathrate-veined, glabrous above, minutely asperulous and sparsely papillose beneath; panicles 2–3 dm. long, laxly branched, tomentulose, bracts and bractlets subulate, 2–3 mm. long; pedicels 1 mm. long; sepals ovate, nearly 3 mm. long, subcoriaceous tomentulose, the unguiculate petals about as long, pubescent at base, the 2 scales a third as long, pubescent; disk

tomentulose; stamens 3 mm. long, the basal trichomes reddish; ovary tomentose; capsule obovate-trigonous, shortly stiped, tomentose within and without, 1.5 cm. long, the obovoid basally arillate seed 1 cm. long.—*C. polyodonta*, 1030, of Ecuador is similar but the leaves are said to be epapillose. F.M. Neg. 5689.

San Martín: Juanjuí, *Klug 4266* (det. Standley, sp. nov.).—Amazonas: Tactamal to Vilaya, Prov. Luya, 1,400 meters, *Weberbauer 7143*.—Cuzco: Macchu-picchu, *Soukup 205; 865*. To Panama, Venezuela.

Cupania papillosa Radlk. Sitzungsb. Akad. Wiss. München 9: 520. 1879; 1029.

Small tree with rusty tomentulose flowering branchlets including the large panicles, the older glabrescent and lenticellate; leaves ample, often 2.5–3 dm. long, typically with 6–10, apparently often fewer, alternate or subopposite oblong leaflets, obtuse or in Peru somewhat retuse, shortly acute at base, in type 6–15 cm. long, 2–5 cm. wide, in Peru to 3 dm. long, half as wide (*C. latifolia?*), more or less serrate-dentate, coriaceous, the nerves and veins beneath hirtellous tomentulose, papillose between the prominently reticulate veins, glabrous above; pedicels 1–2 mm. long; sepals ovate, tomentulose, 2 mm. long scarcely equaled by the basally pubescent clawed petals; disk tomentose; capsules turbinate-triangular, shortly stiped, tomentose within and without, 1–1.5 cm. long, the subglobose basally arillate seed nearly 1 cm. long.—Toward *C. americana* L. with subglobose capsules and, especially *C. latifolia* HBK., 1030, with flowers 3 mm. long and obovate subretuse leaflets and it seems probable that at least as regards the Peruvian material, there is no substantial distinction.

Peru (possibly; cf. note above). Colombia.

Cupania scrobiculata Rich. Act. Soc. Hist. Nat. Paris 1: 109. 1792; 1051.

Branches sulcate, early pulverulent; leaflets mostly 6–8, rarely 10–12, sometimes subopposite, oval or elliptic-oblong or oblong, obtusish to acuminate, entire or repand-dentate, petiolulate or subsessile, chartaceous-coriaceous obviously clathrate and reticulate-veined beneath and mostly notably foveolate in the nerve axils, glabrescent both sides, lustrous or sometimes opaque beneath, obsoletely pellucid-punctate and lineolate. usually 5–15 cm. long, 2–2.5 cm. wide, panicles axillary or subterminal, often 2–3 dm. long,

pulverulent tomentulose; bracts subulate-filiform, about 2 mm. long; pedicels scarcely 1 mm. long, about 2 mm. long in fruit; disk glabrous; sepals 1.5 mm. long, oval-oblong, chartaceous, tomentulose without, nearly equaled by the acute or obtuse ciliolate petals; stamens 2 mm. long, pubescent below the middle; capsules turbinate, more or less tricornate, 1–2 cm. long contracted into stipe 3–6 mm. long, reddish tomentose without, lanate within, the black ellipsoid seed two-thirds arillate.—Illustrated, Mart. Fl. Bras. 13, pt. 3: *pl. 115.*

Río Acre: Mouth of Río Macauhán, *Krukoff 5600; 5523; 5524.* To Panama and the Guianas.

14. MATAYBA Aublet

Shrubs or trees similar to *Cupania* except that the small calyx is cupulate, opening early, 5-dentate-lobed, the segments subimbricate only at base and, in the Peruvian species, the leaflets are entire. Species mostly little known and the Peruvian collections are too few or too incomplete for definite determination.

Leaflets 2–4 cm. long, 1–1.5 cm. wide.....*M. peruviana.*
Leaflets much larger.
Leaflets 3–5, 7–12 cm. wide, drying pale green.....*M. purgans.*
Leaflets 6 (2)–12, 1.5–5.5 cm. wide, drying dark.
Fruits glabrous within as without; leaflets 2–6..*M. arborescens.*
Fruits densely tomentose within; leaflets to 12...*M. guianensis.*

Matayba arborescens (Aublet) Radlk. Sitzungsb. Akad. Wiss. München 9: 535. 1879; 1082. *Sapindus arborescens* Aublet, Pl. Guian. 1: 357. *pl. 139.* 1775.

Glabrous, except the tips of the young branches, these yellowish-tomentulose; leaflets usually 6 (3–8), alternate or subopposite, elliptic-lanceolate or lanceolate, acuminate, entire, petiolulate or subsessile, chartaceous, hypodermatous tissue lacking, densely pellucid-punctate, 7–21 cm. long, 4–8 cm. wide, the 9–15 lateral nerves rather prominent on both sides; petiolules 2–5 mm. long, canaliculate above, bulbous at the base; panicles shortly tomentulose or laxly puberulent, sometimes subequaling the leaves; bracts and bractlets minute; cymules of male flowers subsessile, those of the female more or less stiped; pedicels about 1.5 mm. long, 3–4 mm. long in fruit, calyx scarcely exceeding 1 mm., deeply lobed, the acute chartaceous-coriaceous lobes appressed puberulent; petals acute,

about 1 mm. long, pubescent, exceeded by the lanate scales; stamens nearly 3 mm. long, the filiform filaments pubescent below, the anthers puberulent; ovary appressed pilose; capsules 1.5–2 cm. long and broad, the black lustrous seed with white aril.—The Peruvian collections are all in fruit and the determination is certainly open to question.

Loreto: Mishuyacu near Iquitos, *Klug 2508; 2513; 636.* To the Guianas.

Matayba guianensis Aublet, Pl. Guian. 1: 331. *pl. 128.* 1775; 1097.

Much branched above, the subterete or lightly sulcate branches glabrescent or puberulent; petioles somewhat complanate and pubescent above; leaves 1.5–3.5 dm. long with 2–12 usually oblong-ovate-lanceolate leaflets, sometimes with some smaller ones between them, commonly rather acutely acuminate, more or less contracted to the short or longish petiolules, 5–15 cm. long, 1.5–5.5 cm. wide, few-nerved, 1–many foveolate (or not at all), glabrous or lightly pilose only beneath, subimpunctate or densely so and lineolate; panicles ample or contracted, equaling or exceeding the leaves, puberulent or tomentulose, the cymules shortly stiped, the white flowers on pedicels 1–2 mm. long; calyx 1–nearly 2 mm. long, coriaceous, the lobes rounded, somewhat puberulent; petals 1–2 mm. long, equaled by the reddish lanate scales; disk glabrous; capsule trigonous-subglobose, shortly stiped, 1–2 cm. long, more or less verruculose, glabrate without, densely tomentose within.—Variable. The Killip & Smith species in fruit doubtful, the capsule long-stiped. According to the author attains 20 meters.

San Martín: Zepelacio, *Klug 3658* (det. Standley).—Huánuco(?): *Haenke* (fide Radlk.).—Loreto: Santa Rosa, *Killip & Smith 28782?* To the Guianas.

Matayba peruviana Radlk. Sitzungsb. Akad. Wiss. München 9: 536. 1879; 1080.

Branches terete, early tomentulose, with few leaves of 8–14 opposite or subalternate shortly lanceolate obtusely acuminate chartaceous-coriaceous many-nerved petiolulate leaflets 2–4 cm. long, 1–1.5 cm. wide, acutish at base, glabrous above, appressed and sparsely pubescent beneath except on midnerve, barbate on the many round foveoli and with immersed digitiform glands, minutely lineolate and punctate-pellucid; petioles and rachises tomentose,

especially above; panicles axillary, solitary, subequaling the leaves, tomentose, the white flowers shortly pedicelled; calyx nearly 1 mm. long, coriaceous, appressed setulose pilose without; petals 1.5 mm. long, the 2 lanate scales a third as long; stamens puberulent at base; disk glabrous; style 2–3-lobed, equaling the setulose ovary.—A branched tree about 4 meters tall (Spruce). F.M. Negs. 6037; 23630.

San Martín: Guayrapurina near Tarapoto, *Spruce 4619*, type. Loreto: *Ule 6719*. "Canela ucsha."

Matayba purgans (Poepp. & Endl.) Radlk. Sitzungsb. Akad. Wiss. München 9: 536. 1879; 1094. *Cupania purgans* Poepp. & Endl. Nov. Gen. & Sp. 3: 38. 1844.

Shrub or tree 1–6 meters high with subterete lightly sulcate glabrescent branches and large leaves with 3–5 alternate or subopposite leaflets, the glabrous common petioles 9–12 cm. long, complanate above, convex beneath; leaflets petiolulate, broadly elliptic or the lower subovate, acutish or subrounded at base, very obtusely acuminate-apiculate, 15–30 cm. long, 7–12 cm. wide, chartaceous, efoveolate, green both sides, microscopically glandular and pilose, otherwise glabrous, obscurely pellucid-punctate, hypoderma none, nerves only about 8; panicles thyrsoid, scarcely half as long as the petioles, mostly 2–3-fasciculate, rusty tomentulose, the cymules sessile, the pedicels 1 mm. long, the small flowers white; calyx and petals 1 mm. long, the former tomentulose, the 1 mm. long scales lanate; capsule shortly stiped, subchartaceous, glabrate without, the endocarp pilose, 18 mm. long, 16 mm. broad, the dark seed enclosed by the bluish viscid-succulent aril.—The name refers to Poeppig's observation as to the property of the seeds. Illustrated, Mart. Fl. Bras. 13, pt. 3: *pl. 120*.

San Martín: Tarapoto, *Ule 6445; Spruce; Williams 6493*.—Loreto: Balsapuerto, *Klug 2950* (det. Standley); *Killip & Smith 28528* (det. A. C. Smith). Amazonian Brazil. "Itua" (Poeppig).

15. LLAGUNOA R. & P.

Shrub or tree distinctive in Peru by the conspicuous green or slightly purple-tinged flowers, 1–7 on rather long pedicels in the axils of the simple or mostly simple leaves. Flowers oblique with no petals but a prominent unilateral widely expanded disk, in the Peruvian species unequally lobed. Stamens a little exserted in the male flowers, the filaments glabrous or merely puberulent.

Style subulate-filiform. Capsule subglobose-trilobed, pendulous, 3-valved, each valve with a solitary lustrous black globose seed without aril.

Llagunoa nitida R. & P. Syst. Veg. 252. 1798; 1343. *Amirola nitida* (R. & P.) Pers. Syn. Pl. 2, 565. 1807.

Young branches, petioles (1–2 cm. long) and inflorescences (2–3 cm. long) lightly pubescent, finally glabrous; leaves simple or trifoliate, the lateral then small, the terminal sometimes lobate, dentate, broadly ovate-elliptic, sometimes oblong-elliptic, acutish or obtuse, rounded or narrowed at base, 6–11 cm. long, 2–5.5 cm. wide, glabrous or even tomentose beneath (var. *mollis* (HBK.) Radlk.), the younger densely glandular; dichasia usually 3–7-flowered, the peduncles and 5–15 mm. long pedicels glandular and puberulent as the calyx within, this expanded 1–1.5 cm.; stamens 6 mm. long, typically glabrous with red anthers; fruit crustaceous, 15–18 mm. across, the seeds 6 mm. in diameter.—Trunk said to attain at least 1 dm. Illustrated, Hook. Icon. 2: *pl. 132.* F.M. Neg. 36021.

Known, according to Ruiz and Pavón, as the "Arbol de cuentas de rosario," in reference to the use of the lustrous black round seeds for the making of rosaries; the wood beautiful for cabinets, being white with black markings (Stork & Horton).

Cajamarca: Prov. Jaén, *Weberbauer 6179.*—Amazonas: Chachapoyas, *Mathews; Weberbauer 4302;* 191. Llata, *2283* (det. Johnston).—Ancash: Valley of the Río Puccha, *Weberbauer 3736;* 174.—Huánuco: Muña, *3935; Ruiz & Pavón,* type.—Apurímac: Valley Río Pincos, *Weberbauer 5915* (robust and leaves oblong-elliptic).—Ayacucho: Tambo, *Weberbauer 5549.*—Huancavelica: Prov. Tayacaja, hills and ravines, 2,000 meters, *Stork & Horton 10406.*—Cuzco: Valley Urubamba, *Weberbauer 5069;* 237. Torontoi, 2,400 meters, *Cook & Gilbert 1770.* Prov. Andahuaylas, 2,600 meters, *Vargas 8801.*—Puno: Sandía, *Weberbauer,* 245. Ecuador. "Arbol de rosario."

16. DODONAEA L.

Reference: Sherff in Field Mus. Bot. 23: 269–317. 1947.

Resinous-viscid shrubs with subopposite exstipulate simple leaves and small dioecious or hermaphrodite regular flowers, pedicelled in panicled racemes, corymbs or panicles. Sepals often 4, valvate or narrowly imbricate, finally reflexed and deciduous.

Petals none. Disk obsolete but in the female flowers a short carpophore. Stamens 5–8, the filaments very short. Fruit a 2–5-angled or winged capsule that simulates a samara; the cells 2- (or 1-) seeded.

Dodonaea viscosa (L.) Jacq. Enum. Carib. 19. 1760; 1363. *Ptelea viscosa* L. Sp. Pl. 118. 1753.

Glabrous viscous shrub-tree, the erect reddish-brown flowering branches compressed, angled and with an elevated line below the insertion of the more or less petioled leaves, these varying from subobovate-cuneate to lanceolate or sublinear, acute or obtuse, entire but the margins sometimes unequally subrepand, to 15 cm. long, 2 cm. or so wide, subchartaceous, pale green, lustrous and with many fine lateral nerves; panicles in flower about half as long as the leaves, the 5–8 mm. long pedicels twice as long in fruit; flowers greenish-white or reddish, 3 mm. long often hermaphrodite; sepals usually 4, trinerved, puberulent marginally; capsule suborbicular, excised apex and base or subcordate, mostly triquetrous, 3-celled, each cell surrounded by a membranous radiately reticulate-veined often roseate wing.—Herrera in Contrib. Fl. Cuzco, ed. 1. 2: 118 gave two names to Raimondi collections, both without description, which ought not to be cited even as synonyms. Sherff has thought it worth while to reinterpret the many variations, those in Peru being var. *linearis* (Harv. & Sond.) Sherff, f. *angustifolia* (Benth.) Sherff (*Stork & Horton 1005; Vargas 9781*, leaves 5–11 cm. long); var. *vulgaris* Benth., f. *Burmanniana* (Schum. & Thon.) Radlk. (*Stork & Horton 10784; 10413*), leaves 7–11 by 1.5–2 cm., acute or obtusish and f. *Schiedeana* (Schlecht.) Radlk., leaves to 16 cm. long, 2 cm. wide, gradually acuminate both ends; var. *arborescens* (Cunn.) Sherff, f. *spatulata* (Sm.) Sherff (Chachapoyas, *Williams 7564*), leaves often more or less sinuate-dentate.

Common, especially in the interandean valleys between 1,000 and 3,000 meters and known everywhere by the native name "Chamana" (Weberbauer). Used for fuel; crushed leaves applied effectively in poultices for sprains (Ruiz & Pavón). Leaves mixed with coca if latter too strong and with branches used for mattresses, the gum sticking them together firmly (Stork & Horton).

Cajamarca: Socota, *Stork & Horton 10095*. Above Santa Cruz, *Weberbauer*, 189.—Amazonas: Chachapoyas, *Williams 7564*.—Ancash: Caraz, 2,200 meters, *Weberbauer 3010;* 173. Huantar, Puccha Valley, *Weberbauer*, 174. Grass steppes, Río de Chiquian,

Weberbauer, 177.—Huánuco: Near Huánuco, *2052; Kanehira 64.* Mito, *3335.* Below Ambo, dominant on dry rocky eastern slopes, *2416.* Uspachaca, *1313.* San Rafael, *Sawada P120.* Valley of the Marañón, *Weberbauer*, 190. Valley of Utcubamba, *Weberbauer*, 191.—Junín: Tarma, *Killip & Smith 21818; Ruiz & Pavón.* Tarma Valley, 2,700 meters, *Weberbauer 2387;* 176.—Ayacucho: Near Río de Lomas, *Weberbauer 5753.*—Huancavelica: *Stork & Horton 10413.* —Apurímac: *Stork & Horton 10784; Vargas 9781.*—Cuzco: Prov. de Paruro, *Raimondi.* Pomachaca, Urubamba, *Weberbauer 5049;* 277. Ollantaitambo, *Cook & Gilbert 737.*—Puno: Sandía, *Weberbauer 547;* 238. All warm regions. "Chamana," "chamisa" and "chamassa" (Ruiz & Pavón).

RHAMNACEAE. Buckthorn Family

Commonly shrubs (*Gouania, Ampelozizyphus, Sageretia,* scandent) or small trees, rarely herbs, often thorny or the stipules spiniform, these otherwise small or obsolete, always simple-leaved and the flowers regular, usually 5- (or 4-) merous and in little umbels that frequently are racemose or panicled. Petals, if present, ordinarily cucullate or involute, and inserted with the stamens into the edge of the thin or fleshy disk which often lines the short or long calyx-tube and sometimes unites it to the 2–5-celled (rarely incompletely 2-celled) ovary, the cells usually 1-ovuled. Fruit a drupe with 1–3 pyrenes or a capsule with 1 erect seed in each cell, or less often consisting of 3 cocci that may be winged.

Family known for several products, especially for "cascara sagrada," obtained from *Rhamnus Purshiana* DC. of western North America, and *R. cathartica* L. of the Old World. The fruit "jujube" (*Zizyphus Jujuba* Mill.) of the Mediterranean region and the similar *Z. mauritiana* Lam. may be cultivated in Peru; unlike the Peruvian species these shrubs have fruits about the size of olives, reddish or yellowish with a sweet edible pulp, and the latter species is tomentose. For an excellent account of these and other cultivated Rhamnaceae in Argentina, some of which of course are probably grown in Peru for ornament or for hedges, see Marzocca y Marthi, Ministr. Agric. y Ganad. 7, fasc. 120: 1–48. 1951.

The key has been devised of course as an aid in the determination of Peruvian components of the family and not to suggest possible relationships or to give technical characters.

Shrubs, rarely scandent but then without tendrils and lateral nerves not parallel.

Leaves multinerved, the nerves from midnerve subparallel; fruit capsular.....1. *Alzatea.*

Leaves medially 3-nerved from at or near the base.

Erect shrubs; fruit drupiform.....2. *Zizyphus.*

Liana, long-leaved; fruit capsular.....7. *Ampelozizyphus.*

Leaves pinnately nerved, sometimes lacking except in vegetative (growing) periods.

Plants sparsely leafy, the small leaves often absent except in growing season; branchlets, unless younger, often thorny; fruit drupiform, or tardily capsular.

Leaves as branchlets opposite or nearly; ovary 2–4-celled.

Flowers sessile or nearly; fruits drupiform.....6. *Scutia.*

Flowers pendent; fruits finally capsular.....10. *Colletia.*

Leaves as branchlets alternate; ovary incompletely 2-celled. 3. *Condalia.*

Plants abundantly foliose; spines if present small, stipular.

Leaves opposite or subopposite (Peru).

Flowers sessile in open inflorescence; upper stems often scandent; drupe with 3 nutlets.....4. *Sageretia.*

Flowers pedicellate or subsessile but crowded; erect shrubs or trees.

Calyx tube persisting but not adhering to baccate fruit; leaves without basal glands.....5. *Rhamnidium.*

Calyx tube adhering basally to capsular fruit; leaves (Peru) biglandular.....8. *Colubrina.*

Leaves alternate; fruit baccate or drupiform.

Shrubs never spiny; fruit somewhat fleshy, indehiscent. 9. *Rhamnus.*

Shrubs often spiny; fruit baccate, the carpels finally dehiscing.....8. *Colubrina.*

Liana or clambering, tendrils usually present, the leaves with subparallel lateral nerves.....11. *Gouania.*

1. ALZATEA R. & P.

Generic character that of the single species.—Seems affine *Maytenus* but apetalous (DeCandolle); some of its characters

suggest affinity to Icacinaceae; but according to Loesener, Pflanzenfamilien, ed. 2, 20b, it may be a part of Rhamnaceae. The leaves simulate those of some Guttiferae.

Alzatea verticillata R. & P. Fl. Peruv. 3: 20, *pl. 241*. 1802.

Glabrous stout-trunked tree with purplish verticillate branches, opposite and verticillate petioles, ample coriaceous entire oblong-obovate leaves, lustrous above, and many-flowered terminal corymbs of lutescent apetalous flowers; calyx campanulate, colored, 5-parted; stamens 5, apparently inserted on disk, filaments short, anthers erect, cordate; style short, stigma obtuse; ovules affixed centrally base to apex, the sessile ovary obcordate and 2-celled as the bivalved several-seeded capsule; seeds winged, aril none.—Illustrated, Ruiz & Pavón, Prodr. *pl. 7*. F.M. Neg. 29349.

Huánuco: In woods near Mesapata, Chinchao, *Ruiz & Pavón*, type. Bolivia (fide Rusby).

2. ZIZYPHUS [Miller] L.

Commonly conspicuously thorny, the alternate subdistichous coriaceous leaves 3-plinerved. Flowers in short axillary cymes. Petals 5 (rarely none), cucullate, deflexed. Calyx 5-parted with broadly obconic tube persisting beneath in fruit, the ovate acute spreading lobes carinate within and 3-angled. Disk plane, marginally pentagonous, free. Ovary superior or semisuperior, 2- (rarely 3–4-) celled. Drupes somewhat fleshy, 1–3-seeded.—Originally *Ziziphus*, derived from the Arabian or Greek native name.

Leaves subrotund, villous on nerves beneath . . . . . *Z. piurensis.*
Leaves oblongish, glabrous or puberulent.
Leaves puberulent, 1–1.5 cm. wide . . . . . *Z. Weberbaueri.*
Leaves glabrous, 3–6 cm. wide . . . . . *Z. cinnamomum.*

Zizyphus cinnamomum Tr. & Pl. Ann. Sci. Nat. sér. 5. 16: 380. 1872.

Cinereous-barked branchlets with numerous oblong lenticels; leaves oblong-elliptic, obtuse, to 1.5 dm. long, half as wide, glabrous, coriaceous, glaucescent, very finely and closely reticulate-veined, the 3 primary nerves prominent; peduncles short, arcuate-reflexed, lenticellate; pedicels and calyces tomentulose (authors). F.M. Neg. 4703.

Loreto: Pongo de Manseriche (*Tessmann 4703*, det. Mansfeld). Colombia.

Zizyphus piurensis Pilger, Bot. Jahrb. 54: Beibl. 117: 46. 1916.

Younger branchlets, petioles, these to 1 cm. long, and axillary and terminal cymules densely puberulent; leaves broadly ovate, usually subrotund, rounded both ends, distinctly crenate or obtusely serrate-crenate, 5– (8) cm. long, 3–5 cm. wide, chartaceous, glabrous above, villous beneath, especially toward the base of the 3 principal nerves, the dense reticulate venation faint; sepals obviously carinate within, 1.5 mm. long, equaled by the petals.—Allied to *Z. thyrsiflora* Benth. of northern Ecuador with much less pubescent leaf-veins and cymules; that species also has more remotely crenulate leaves that are firmer and lustrous above. However, more material may show the Peruvian tree, known to attain 8 meters, only a variant. There is also a resemblance to *Z. undulata* Reiss. of Brazil, glabrate, the leaves acutish.

Piura: Morropón to Salitral, 150 meters, *Weberbauer 5962*, type. "Palo negro," "evano" (Ruiz & Pavón for *Z. thyrsiflora*).

Zizyphus Weberbaueri Pilger, Bot. Jahrb. 54: Beibl. 117: 46. 1916.

Branchlets divaricate, geminately short-spinose at some of the upper nodes, the spines mostly 5–10 (14) mm. long; petioles 4–5 mm. long, canescent puberulent as the young branchlets and small axillary and terminal cymes including the scarcely 1.5 mm. long sepals; leaves rather rigid, nearly concolorous, sparsely puberulent, beneath on the 3 principal nerves especially toward the base, densely reticulate-veined, minutely serrulate or subentire, ovate-oblong-lanceolate or rarely long-oval, 1.5–3.5 cm. long, 8–16 mm. wide; petals narrowly cochleate-spatulate, 1.5 mm. long; disk rather thick, lightly crenulate; fruit reddish, globose-ellipsoid, 1 cm. long.—To 6 meters tall. Related to *Z. mistol* Griseb. of Argentina and to *Z. oblongifolius* Sp. Moore of Brazil, the last with different shaped leaves, shorter spines, the first with leaves more glaucous beneath and less pubescent cymes, smaller fruit (Pilger). The species of Spencer Moore seems to be nearest but that is glabrous; the validity of these species depends on the variability of these characters, as yet unknown.

Apurímac: In savana below Curahuasi, 2,100 meters, *Weberbauer 5920*, type.

3. CONDALIA Cav.

Much branched, the often spreading branchlets usually terminating in a rigid spine. Leaves alternate, entire, with minute stipules. Flowers axillary, solitary or usually in small umbels with several flowers, sometimes panicled. Calyx deeply 5-lobed; petals often none. Ovary free from both calyx and disk, incompletely 2-celled with 1 or 2 ovules; style base persisting on the drupe.—The euphonious name commemorates a Spanish physician, A. Condal, companion of Loefling on his voyage to the Río Orinoco.

Condalia Weberbaueri Perk. Bot. Jahrb. 45: 463. 1911.

Shrub with numerous short apically subulate-spinescent branchlets, these early sparsely gray-pilose as the 1.5–3 mm. long petioles; leaves obovate or obovate-oblong, long-attenuate to base, acutish, mucronate, mostly 1–2.5 cm. long, 3.5–9 mm. wide, entire, glabrous above, grayish-pilose or on the 6–7 lateral nerves tomentose beneath; stipules ovate, persisting; flowers axillary, solitary or fasciculate, 3.5 mm. long, the glabrous filiform pedicels 3–6 mm. long; calyx membranous, lightly pilose without, the ovate acuminate lobes spreading; petals none; ovary glabrous, 2-celled(?), the ovules solitary; drupes ovoid, 7–8 mm. long, 5 mm. thick, ligneous, the style 5 mm. long.—Easily distinguished from the related *C. buxifolia* Reiss. by the form of the pubescent leaves and the pubescent calyx (Perkins); my collection from a shrub to 1 meter high, fruits purplish. F.M. Neg. 5840.

Junín: Tarma, *Ruiz & Pavón; Weberbauer 1724*, type; *1076*.—Huánuco: Huánuco and Pillao, *Ruiz & Pavón*. "Tanacancha" (Ruiz & Pavón). Bolivia.

4. SAGERETIA Brongniart

Resembles *Scutia* but the minute flowers disposed in panicles or glomerulate in the axils of the opposite or subopposite often decussate branchlets. Disk cupulate, marginally 5-lobed. Ovary 3-celled. Drupes globose with 3 indehiscent pyrenes.

Sageretia elegans (HBK.) Brongn. Ann. Sci. Nat. sér. 1, 10: 359. 1827. *Rhamnus elegans* HBK. Nov. Gen. & Sp. 7: 53, *pl. 619*. 1824.

Branches more or less spinescent, the slender virgate upper ones often somewhat scandent, usually densely canescent puberulent

as often the younger leaves and the leafy panicles of sessile greenish-white flowers; leaves lanceolate to ovate-elliptic, glabrous (or nearly) and lustrous at maturity, subcoriaceous, rounded or subcordate at base, acute or acuminate, usually 4–9 cm. long; calyx laxly tomentulose, 1–1.5 mm. long; fruit black or dark, subglobose, 6–8 mm. in diameter.

San Martín: Lamas, *Williams 6417*. Tarapoto, *Williams 6134; 6251; 6503; Spruce 4416*. To Mexico.

5. RHAMNIDIUM Reissek

Shrub or small slender tree much like *Rhamnus* except that the leaves are opposite or subopposite and the fruit finally baccate, only 1–2-celled.

Rhamnidium elaeocarpum Reiss. in Mart. Fl. Bras. 11, pt. 1: 94. 1861.

Branchlets opposite, abundantly lenticellate, the tips as petioles (4–12 mm. long), leaves beneath and cymes more or less puberulent; stipules interpetiolar, oblong-acuminate, deciduous; leaves elliptic-oblong, acute or obtusish, often subcordate at base, usually 7–10 cm. long, 2.5–5 cm. wide, with 8–12 lateral nerves; peduncles 4–8 mm. long, the many-flowered cymes simply dichotomous, finely pubescent; calyx 4–5 mm. long, subequaling the pedicels, tube broadly obconic, lobes erect, acute, strongly tubercled within, carinate; petals bilobed, involute; fruit ellipsoid, 10–12 mm. long, calyx cup and often stamens persisting.—Forming undergrowth in dense forest to about 6 meters, the bark coarsely fissured (Williams, Field Mus. Bot. 15: 299. 1936; see also for wood anatomy). Illustrated, Reissek, l.c., *pl. 31*.

San Martín: Near Tarapoto, *Williams 6887; 6888* (det. R. Gross). To Paraguay and Brazil.

6. SCUTIA Comm.

Scypharia Miers, Contr. Bot. 1: 299, *pl. 42*. 1861, fide Weberbauer, Field Mus. Bot. 8: 83. 1930.

Spiny or rarely unarmed shrubs, the branchlets often angled, the coriaceous leaves opposite or nearly and pinnately nerved, the 5-merous flowers fasciculate or congested in small axillary umbels. Calyx-tube hemispheric or turbinate, the acute lobes thickened apically. Petals plane or cucullate, nearly equaled by the stamens.

Disk with undulate margin. Ovary free, 2–4-celled. Fruit obovoid or subglobose, dry or scarcely fleshy, with 2–4 pyrenes and basally enclosed in the calyx-tube.—*S. guayaquilensis* (HBK.) Weberbauer, while similar to the known Peruvian species, is distinguishable by the form of the leaves (Weberbauer); they are elliptic, rounded but mucronate at tip, decurrent to short petioles, softly canescent pubescent beneath.

Flowers sessile.....*S. spicata.*
Flowers shortly pedicellate.....*S. pauciflora.*

Scutia pauciflora (Hook. f.) Weberb. Field Mus. Bot. 8: 84. 1930. *Discaria pauciflora* Hook. f. Trans. Linn. Soc. 20: 229. 1851. *Scypharia (parviflora) pauciflora* (Hook. f.) Miers, Contr. Bot. 1: 301, *pl. 42.* 1861. *D. parviflora* Hook. f. ex Miers, l.c.

Terete branches and branchlets spinescent; leaves caducous, few, oblong-obovate or oblong, mucronate, shortly petioled; flowers solitary or binate, subsessile; petals very broadly spatulate, bifid; ovary 2-celled.—Distinguished by the very small flowers and the bifid petals (Hooker f.).

Peru: (possibly). Galapagos; Ecuador.

Scutia spicata (Willd.) Weberb. Field Mus. Bot. 8: 83. 1930. *Colletia spicata* Willd. ex Roem. & Schult. Syst. 5: 513. 1819. *Rhamnus senticosa* HBK. Nov. Gen. & Sp. 7: 54. 1824. *Sageretia senticosa* (HBK.) Brongn. Ann. Sci. Nat. sér. 1, 10: 360. 1827. *Scypharia senticosa* (HBK.) Miers, Contr. Bot. 1: 301, *pl. 42.* 1861. *Scutia maritima* Perk. Bot. Jahrb. 45: 464. 1911.

Glabrous, the many terete or sub-4-gonous green spiny branchlets subopposite the opposite subulate spreading spines 2.5–6 cm. long; stipules minute, ovate-subulate; leaves few, solitary at base of spines (petioles canaliculate, articulate to base, 2 mm. long), ovate, obtuse, rounded at base, sub-5-plinerved, subcoriaceous, glaucous-green, about 2.5 cm. long; flowers minute, 1–2 or 5–6-fasciculate-glomerate, sessile; calyx subhemispheric, medially 5-parted, the ovate acute spreading segments valvate before anthesis; petals 5, scale-like, emarginate-bilobed, included, subcucullate; anthers 2-celled, affixed dorsally above base; ovary depressed-globose, 3-celled, the cells 1-ovuled; style very short, the 3 stigmas obtuse; disk thin, seeming obsolete; fruit globose, 1–3-seeded, the seeds lenticular.—After HBK. This, as the related *S. arenicola* (Casar.) Reiss., has thinner disk than in *S. buxifolia* Reiss. (Weberbauer). The stout green

thorns, often 6 cm. long, make passage through thickets of these shrubs impossible; the small red fleshy fruits are sour but very palatable, according to Svenson, who gives a habital photograph, Amer. Journ. Bot. 33: 396. 1946. Attains about 3 meters often in stands alone, and characteristic for the dry coast land from southern Ecuador to region of Chala, southern Peru, and reaching at most 1,600 (1,800, Mexia) meters, this in central Peru (Weberbauer). Illustrated, Miers, Contr. Bot. 1: *pl. 42 C.* F.M. Neg. 9489.

Tumbez: Coastal plain, *Weberbauer 7745.*—Piura: Quebrada Mogollon, Amotape Hills, abundant (*Haught & Svenson 11540*). Contumasay, Prov. Truxillo, *Bonpland* (type, *R. senticosa*). Nigritos, *Haught 68.*—Libertad: La Goldina, Prov. Trujillo, *Worth 9056* (det. Johnston).—Ancash: Yautan, *2561.*—Lima: Chosica to Matucana, *Mexia 04076.* Above San Bartolomé, *Weberbauer 5207.* Prov. Chancay, *Goodspeed 17354.* Prov. Huarochiri, *Goodspeed Exped. 30219* (det. Killip). Río de Lomas, *Weberbauer 5739.* "Molono" (Bonpland), "lipe," "muchilco" (both Weberbauer). Galapagos; Ecuador.

7. AMPELOZIZYPHUS Ducke

Robust liana with alternate entire 5-nerved leaves, the 2 outer nerves slender or obscure, and hermaphrodite flowers in axillary cymes mostly on the uppermost leafless branches forming elongate racemes or in ample panicles. Stipules caducous. Calyx-tube shortly turbinate, the five 1-nerved apically callosed lobes spreading, subequaled by the long-clawed petals, these inserted with the shorter stamens at the margins of the adnate plane entire disk. Ovary 3-celled, completely connate with calyx-tube and disk, the solitary ovules erect. Capsules stiped by the stout torus the more or less reflexed calyx-lobes persisting, 3-seeded, the seeds exalbuminous, thus distinct from *Colubrina* the capsules at maturity dehiscent elastically (Ducke). Immature fruits suggest drupes, perhaps evidence of the tenuous character of the taxonomy within the family.

Ampelozizyphus amazonicus Ducke, Arch. Inst. Biol. Veg. 2: 158. 1935.

Glabrous except reddish-pubescent growing parts including inflorescences; reddish bark of branchlets laminulately deciduous; petioles to 2.5 cm. long; leaves ovate-elliptic, rounded or obtuse

at base, shortly acuminate or obtuse, coriaceous, 1.5–2.5 dm. long, 7–12 cm. wide, or usually much smaller on fertile branchlets; peduncles to 2 cm. long; pedicels 2–3 mm. long; calyx 2 mm. long, the lobes tomentulose within; fruits glabrous, obovoid.—Inflorescence and leaves suggest certain Menispermaceae; outer bark has odor of methyl salicylate, as that of *Pourouma*, some Polygalas and *Parkia oppositifolia* (Ducke). Capsules depressed-trigonous, strongly callose-carinate, to 2 cm. high, 3 cm. wide; endocarp crustaceous (Ducke, l.c. 4: 47. 1938). Illustrated, Ducke, l.c. *pls. 1, 2,* opposite 172 and l.c. 4: 47. *pl. 3* (fruit).

Loreto: Mishuyacu near Iquitos, *Klug 410; 566; 589.* Amazonian Brazil.

"Saracura-mira" (Ducke).

8. COLUBRINA Richard

Cormonema Reissek in Mart. Fl. Bras. 11, pt. 1: 96. 1861. *Caesia* Vell. Fl. Flum. 3: *pl. 23,* Text 107. 1825.

Trees or shrubs, sometimes spinescent, the alternate or opposite, entire or dentate, pinnate-nerved leaves sometimes biglandular at petiole apex or base of blade. Flowers 5-merous, in axillary fascicles or umbelliform cymes. Calyx-tube hemispheric, the spreading lobes often 3-angled and carinate within. Persisting petals clawed, inserted below the fleshy angulate or lobate disk which lines tube and surrounds the free globose 3-celled ovary. Drupe finally capsular-baccate, the epicarp thin, the carpels within crustaceous or with a hyaline membrane; seeds obovoid.—Reissek separated as a distinct genus species with leaf-glands and, especially, the carpels with a hyaline membrane within; it is questionable if the characters are concomitant and in any case it is practical taxonomy to treat them as indicating sectional division under one name.

Mention may be made of *C. Sprucei* (Suesseng.) Cowan, Brittonia 7: 405. 1952 (*Cormonema Sprucei* Suesseng. Bot. Archiv [Konigsberg, etc.] 39: 387. 1938) from Río Solimões, Brazil, which according to the author is similar to *Cormonema ovalifolia* Donn. Sm. of Central America, differing in having darker lustrous leaves with more acute tips. It has been most agreeable to find a student supporting my union of two genera, in this instance in manuscript.

Leaves opposite or subalternate, the glands at base of blade. *C. glandulosa.*

Leaves alternate, the glands usually at apex of petiole. . *C. Vellozoi.*

Colubrina glandulosa Perk. Bot. Jahrb. 45: 465. 1911.

Unarmed tree, the younger branches and leaves beneath rufo-tomentose, glabrescent or finally glabrous except for the tomentose-pilose cymes and calyces; petioles 1–1.5 cm. long, leaves opposite or sometimes subalternate, oblong-ovate or oblong, rounded at the biglandular (rarely uniglandular) base, obtusely acuminate, 7.5–17.5 cm. long, 3–8 cm. wide, entire, chartaceous, lateral veins 4–6, these often with a few minute trichomes beneath; flowers 4 mm. long; pedicels 1–2 mm. long; calyx-lobes acuminate, spreading, callose-tipped; fruit subglobose, 6 mm. in diameter, the 3 seeds obovoid. —Allied by the author to *C. rufa* Reiss. of Brazil but distinct by the glabrous glandular-based leaves. To 10 meters high (Klug). F.M. Neg. 5846.

San Martín: Juanjuí, *Klug 4349* (det. Standley).—Huánuco: Between Monzón and Río Huallaga, 600 meters, *Weberbauer 3623*, type.—Río Acre: *Ule 9633* (det. Pilger).

Colubrina Vellozoi Cowan, Brittonia 7: 405. 1952. *Cormonema spinosum* (Vell.) Reiss. in Mart. Fl. Bras. 11, pt. 1: 96. 1861, not *Colubrina spinosa* Donn.-Sm., 1897. *Caesia spinosa* Vell. Fl. Flum. 3: *pl. 23*, Text 107. 1825.

Much branched, often armed, the tips of the short or long branchlets typically pubescent; petioles short or to 1 cm. long; leaves lanceolate to oblong- or ovate-elliptic, puberulent on nerves, finally glabrous, biglandular at apex of petioles or very base of blade, usually chartaceous, often several cm. wide and about twice as long, obtuse to acuminate; fascicles ordinarily many-flowered, the pedicels at last 4 mm. long; calyx spreading, 3 mm. broad, the lobes callose-tipped; fruit spherical, the crustaceous 3 carpels or cocci 1-seeded and with a very thin subhyaline inner membrane. —The var. *peruviana* Macbr. ex Cowan, l.c. (*Cormonema spinosum* var. *peruvianum* Macbr. Field Mus. Bot. 8: 124. 1930) has cupuliform instead of patuliform leaf-glands, spines when present mostly about 2 cm. long, leaves subcoriaceous. To 7 meters tall. The species may not be specifically distinct from *C. heteronema* (Griseb.) Standley, known from Panama to Mexico.

San Martín: Chazuta, *Klug 4142; 4143* (det. Standley).—Junín: La Merced, *5368* (type, var.); *5264; Killip & Smith 23530*. Brazil.

9. RHAMNUS L.

Unarmed with usually alternate pinnately nerved leaves, small deciduous stipules and axillary racemose or fasciculately cymose

4–5-merous flowers. Calyx tube after anthesis medially circumscissile the lower portion urceolate, persisting but free about the base of the baccate drupe, the 3-angled lobes carinate within, erect or spreading. Petals rarely none, sometimes plane. Disk plane, the subsessile stamens inserted below its thin margin. Ovary free, 3–4-celled, the fruit with usually 2–4 scarcely or not dehiscent pyrenes.

Branchlets granulately lenticellate; leaves soon glabrous, subentire. *R. granulosus.*

Branchlets smooth, sparsely if at all lenticellate.

Leaves serrulate, firm..... *R. Jelskii.*

Leaves crenulate, membranous..... *R. riojae.*

Rhamnus granulosus (R. & P.) Weberb. Pflanzenfam. 3, Abt. 5: 410. 1895. *Ceanothus granulosus* R. & P. Fl. Peruv. 3: 5, *pl. 228.* 1802.

Densely leafy shrub or small tree, the many branchlets conspicuously lenticellate, the tips, younger petioles (1–1.5 cm. long) and inflorescences early rusty villous-hispidulous except the last soon glabrous; leaves oblong-elliptic or slightly obovate, shortly acute at base, shortly acuminate, usually about 9 cm. long, 5 cm. wide, or to 15 cm. long, 7 cm. wide, subentire or above the middle obscurely and repandly mucro-denticulate, lustrous especially above, glabrous or early more or less pubescent beneath along the nerves or in their axils, soon coriaceous; peduncles to about 1.5 cm. long; pedicels in fruit to 5 or 6 mm. long, umbellately several; calyx lobes scarcely 2 mm. long, ovate, acutish; petals obovate, clawed, included; disk obscure; ovary subrotund-turbinate, 3-celled; fruits subspheroid, 5 mm. thick, sparsely appressed puberulent-hispidulous, the seeds obovoid.—Type collections from Chinchao, Cuchero and Vitoc, *Ruiz & Pavón.* To 8 meters tall (Weberbauer).

Huánuco: Pampayacu, *Kanehira.* Cuchero, *Poeppig 1234.* Chinchao, *Weberbauer 6802* (det. Pilger).

Rhamnus Jelskii Szyszyl. Dissert. Classis Math.-Phys. Acad. Litt. Cracov. 29: 224. 1895. *R. pubescens* (R. & P.) Tr. & Pl. Ann. Sci. Nat. sér. 5, 16: 379. 1872, not Poir. nor Sibth. & Sm. *Ceanothus pubescens* R. & P. Fl. Peruv. 3: 6, *pl. 228.* 1802.

Shrub-tree, the numerous branchlets only at tips, younger petioles, these 1–1.5 (2) cm. long and flowering cymes more or less

canescently rufo-hispidulous or subvillous; leaves oblong-lanceolate to -elliptic or somewhat ovate, acute to rounded at base, acuminate, 3–12 cm. long, 2–6 cm. wide, glandular-serrulate usually nearly from base to apex, subcoriaceous in age, lightly pubescent to glabrate above and beneath or the subparallel (evenly spaced) nerves more villous, as sometimes also the fine veins; peduncles about 1 cm. long or much shorter, pedicels 3–7 mm. long, fulvous villosulous even in fruit; calyx 2.5–3 mm. long, greenish-yellow, the ovate-lanceolate acute lobes erect; drupes depressed ovoid or subglobular, lightly pubescent to glabrous, reddish-black, finally 6–8 mm. thick and nearly as high.—Sometimes 5–8 meters tall and furnishing a dye (Weberbauer). The closely related *R. chrysophyllus* (Reiss.) Weberb. (or *R. pubescens* var. *chrysophyllus* (Reiss.) Ktze.) has the leaves densely and apparently fulvous lanate beneath; *R. Jelskii*, ex char. seems to be the most pubescent form of the Ruiz and Pavón species within Peru, and *R. chrysophyllus* if not specifically distinct would be of course the earlier name. F.M. Neg. 23297 (*R. pubescens*).

Piura: Ayavaca, 2,900 meters, *Weberbauer 6372*.—Cajamarca: Tambillo (*Jelski 324*, type). Cutervo, *Raimondi*. Chota, *Weberbauer 4220*.—Amazonas: Chachapoyas, *Williams 7556* (det. Gross); *Mathews 767* (Mitten Herb.). Pariahuanca, *Weberbauer 6593*.—Junín: Chacahuasi, *Ruiz & Pavón* (type, *R. pubescens*). Panti, *Weberbauer 6593*. Vitoc, *Ruiz & Pavón* (det. Mansfeld).—Huánuco: Cani near Mito, 2,800 meters, *3437* (det. Standley). Chinchao, *Weberbauer 6820*.—Huancavelica: Mantaro Valley, *Weberbauer 6502*. Surcubamba, 2,600 meters, in bushwood, *Stork & Horton 10352*. "Aravisa" (Raimondi).

Rhamnus riojae Perk. Bot. Jahrb. 45: 465. 1911.

Branchlet tips, petioles (5–10 mm. long) and cymes including the calyces fulvous-tomentulose, the former soon glabrescent; leaves oblong or obovate-oblong, cuneate at base, acuminate, papyraceous or chartaceous, very sparsely fulvo-pilose on nerves above, manifestly on the arcuate unevenly spaced nerves and veins beneath, minutely glandular-serrulate, often 6.5–14 cm. long, 2–4 cm. wide; peduncles 1–10 mm. long, cymes 1–1.5 cm. long; flowers 3.5 mm. long, greenish-white; pedicels 5–8 mm. long; calyx-lobes acute; ovary 3-celled, glabrous; drupes depressed globose, about 6 mm. in diameter.—In savana woods, to 2 meters tall; perhaps not consistently distinguishable from *R. Jelskii*. F.M. Neg. 4697.

San Martín: Mayo near Tarapoto, *Spruce 4877* (det. Reissek, n. sp. ined.).—Loreto: Rioja, west of Moyobamba, *Weberbauer 4697*, type. Pumayacu, Balsapuerto to Moyobamba, *Klug 3181* (det. Standley, *R. pubescens*).

10. COLLETIA Comm.

Often leafless shrubs, the decussately opposite branches spinose, notably compressed and sometimes enlarged at the nodes, these not articulate. Flowers 4–6-merous (petals may be lacking), fascicled or solitary below the spines, the 1-flowered pedicels nutant. Calyx membranous, the tube produced above the adnate disk. Ovary 3-celled. Drupes finally capsular, coriaceous with 3 crustaceous bivalved cocci.—For a discussion of the morphology of this and related genera and a taxonomic review of *Colletia* see Miers, Contr. Bot. 1: 230–304. 1851–61. A French botanist, D. Collet of about 1700, is remembered by the name.

Colletia spinosissima Gmelin, Syst. Nat. ed. 13, 2: 408. 1791. *C. spinosa* Lam. Illus. 2: 91, *pl. 129*. 1797. *C. horrida* Willd. Sp. Pl. 1: 1113. 1798. *C. polyacantha* Willd. ex Roem. & Schult. Syst. 5: 513. 1819. *C. Weddelliana*, *C. aciculata*, and *C. Kunthiana* Miers, Contr. Bot. 1: 257, 263. 1851–1861. *C. Ephedra* Vent. Choix 11: *pl. 16*. 1803. *C. aciculata* Miers, Ann. & Mag. Nat. Hist. ser. 3, 5: 214. 1860. *C. obcordata* Vent. Jard. Cels *pl. 92*. 1800.

Much branched, to 1 meter tall, nearly leafless, the branches and branchlets decussately opposite, pale green, hirtellous, apically spinescent with subulate horny point; leaves opposite, subsessile, obovate-lanceolate or spatulate, obtuse, concave, carinate beneath, glabrous; stipules 2, ovate, caducous; peduncles 1–2 (3–4) from axillary tubercles, 1-flowered; flowers pendent, yellowish, only 1 in 3 or 4 fertile; calyx campanulate, 10-nerved, membranous, glabrous, the acute oblong-lanceolate segments reflexing; disk fleshy, entire; petals none; stamens exserted, anthers reniform, dorsiflexed; ovary short-ovoid, sessile, 3-celled; style little exceeding the stamens, the stigma subcapitate; capsules subglobose, glabrous, peduncles 4 mm. long, cocci rounded, chartaceous, seeds subellipsoid, lustrous, 4 mm. long.—After HBK. and thus Miers' *C. Kunthiana*. Calyx greenish-yellow; anthers black (Stork & Horton). Miers, Contr. Bot. 1: 253. 1851–1861, considers the plant of Commerson from Buenos Ayres as the type, which however was figured from a specimen by Jos. de Jussieu from Peru; Lamarck considered them the same.

Miers furthermore proposed *C. aciculata* for the Peruvian plant, and also several other names; types not seen but from accumulated materials and descriptions it is not evident that they represent more than vegetative variations, the characters *apparently* being relative and scarcely concomitant or constant; the problem however is for a student of the group.

Contains colletin that seems to possess tonic properties; bark and young branches serve as an efficacious aid for soap, and entire plant is an excellent fuel for baking ovens (Herrera). Illustrated, Minist. Agric. y Ganad. Argent. 7, fasc. 120, fig. 9. F.M. Negs. 9490 (*C. horrida*); *35969* (*C. Weddelliana*).

Piura: Huancabamba, on the paramo (*Bonpland*, type, *C. horrida*). Pampano above Pisco, *Weberbauer 5370*.—Ancash: Casma, *Raimondi*. Huaráz, gravelly river bluff, *2528*. Llata, shores of Río Marañón, *2280*.—Libertad: Prov. Pacasmayo, *Raimondi*.—Lima: Above San Bartolomé, *Weberbauer 5207*. Above Lima, *Raimondi*.—Junín: Tarma to Palca, *Weberbauer 1727* (det. Perkins); 176; *Ruiz & Pavón; Dombey; Martinet*. Near Huancayo, *Killip & Smith 22030*.—Arequipa: Misti Volcano, *Weberbauer 4835*.—Huancavelica: Gravelly hills, Pampas, *Stork & Horton 10238*. Lake Titicaca (*Weddell 4391*, type, *C. Weddelliana*).—Apurímac: Trail to Abancay, *West 3744* (det. Johnston, *C. Weddelliana*).—Cuzco: Valle del Huatanay, 3,200–3,600 meters, *Herrera 640*. Near Cuzco, *Weberbauer 4893*. Ollantaytambo, *Cook & Gilbert* 416; 1936. Chaspyoc, Huarocondo Rio, *Edmund Heller 2170*.—Puno: Salcedo, *Soukup 466*. "Ccacara" (West), "llague" (Ruiz & Pavón), "zarza de moyse" (Bonpland), "naqui" (Dombey), "yaquil" (Dombey), "roqque." To Chile, Uruguay, Argentina.

11. GOUANIA L.

Cirriferous often high-climbing shrubs with alternate leaves and polygamous 5-merous flowers in terminal or axillary spikes or racemes, the branches or branchlets often produced as a tendril. Disk filling short-obconic calyx-tube, 5-gonous or 5-cornute. Ovary inferior, 5-celled, style 3-branched. Fruit coriaceous, crowned by the persisting calyx, usually 3-winged the 3 subligneous cocci indehiscent, separating in age from the axis.

At least one species, *G. lupuloides*, is well known in many places as a dentifrice, while an infusion of the stems is said to furnish a pleasant bitter in the manner of hops and thus the common English name of "chew-stick."

The need for revision of the genus is great; the Peruvian plants may be referable to one or more of the Brazilian species if Reissek's work in Mart. Fl. Bras. 11, pt. 1: 101–111. 1861 is sound; on the other hand the characters seem intangible that define these from the older widely distributed forms. Without a modern revision available, expediency has determined the key characters which may or may not prove to indicate specific values when the plants are completely known.

Leaves soon glabrous beneath unless on the nerves.

Leaf glands of teeth lacking or minute.....*G. lupuloides.*

Leaf glands obvious.

Glands unless in age closed and tipped with trichomes.
G. trichodonta.

Glands glabrous, mostly open, patelliform or cupulate.
G. adenophora.

Leaves pubescent beneath even when mature.

Fruits winged; callus of leaf-teeth closed or nearly..*G. polygama.*

Fruits wingless; callus of leaf-teeth more or less patelliform.
G. aptera.

Gouania adenophora Pilger, Notizbl. Bot. Gart. Berlin 6: 314. 1915.

Scandent, sparsely cirriferous, glabrescent except new branchlets, axils of the spiciform inflorescences, these to 18 cm. long, and the slightly villous leaf-nerves on both sides; petioles to 1.5 cm. long; leaves ovate- or oval-elliptic, rounded and often a little inequilateral at base, shortly acuminate, acute, to 8 cm. long, 4–4.5 cm. wide, coarsely and irregularly serrate-dentate or undulate, the teeth bearing large cupulate glands, 6–7 nerves prominent only beneath; flowers canescent villous, 5-merous; sepals 1 mm. long, about equaled by the cucullate, scarcely clawed petals; disk glabrous.—Outstanding by the large glands of the leaf-margins, comparable otherwise to *G. trichodonta* (Pilger). Quite possibly a part of *G. lupuloides*. *G. acreana* Pilger, l.c., to which *Tessman 3805* was referred, seems also to be a variant, the many spiciform racemes forming an efoliate panicle. For that matter all of the following material has been determined as *G. lupuloides* or *G. domingensis* var. *pubescens* (Poir.) Ktze. or var. *heterocarpa* Ktze. F.M. Negs 5853; 5852 (*G. acreana*).

San Martín: Juanjuí, *Klug 4311.*—Junín: Puerto Yessup, *Killip & Smith 26224; 26272.*—Loreto: Yurimaguas, *Williams 4981;*

Killip & Smith 28059. Iquitos, *Ule 16* pt., type; *Killip & Smith 27107.* Mishuyacu, *Klug 163; 364; 524; 600; 716; 1392; 1517.* Pebas, *Williams 1640.* Pucallpa, *Soukup 3067.*

Gouania aptera DC. Prodr. 2: 39. 1825. *G. alnifolia* Reiss. in Mart. Fl. Bras. 11, pt. 1: 106. 1861? *G. aptera* Poepp. mss. ex DC. fide Reissek.

Younger branchlets apically subtomentulose; tendrils at tip or at base of spikes; petioles 6–10 mm. long; leaves subcordate or ovate-elliptic to elliptic-subrotund, subacuminate or acute, glandular-crenate with large patelliform glands, 5–7.5 cm. long, 2.5–5 cm. wide, early densely pubescent and tomentulose especially on the 6–7 lateral nerves, in age ferrugineous-puberulous on both sides; spikes interrupted, slender, subracemose; calyx tomentose-furfuraceous, 3 mm. wide, longer than pedicels; disk glabrous, the lobes little shorter than calyx teeth; style puberulent; petals cucullate. —Scarcely distinguishable from *G. polygama,* sens. lat. unless the fruits (unknown) are actually not alate; however, *G. lupuloides* has a variety with fruits obscurely or not alate, as also *G. adenophora.* Illustrated, Reissek, l.c. *pl. 26, fig. 7* (leaf). F.M. Negs. 7015; 5854 (ined. name).

San Martín: Tocache, *Poeppig 1976,* type. Vitoc, *Ruiz & Pavón.* Chazuta, *Klug 4129* (det. Standley, *G. lupuloides*).—Junín: La Merced, *Killip & Smith 23498; 24046.* Warm America.

Gouania lupuloides (L.) Urban, Symb. Ant. 4: 378. 1910. *Banisteria lupuloides* L. Sp. Pl. 427. 1753. *Rhamnus domingensis* Jacq. Enum. Pl. Carib. 17. 1760. *G. domingensis* (Jacq.) L. Sp. Pl. ed. 2. 1663. 1763.

Sprawling or trailing over shrubs or trees, typically glabrous or glabrescent except the minutely pubescent inflorescence; petioles much shorter than the ovate to elliptic leaf-blades, these usually shortly and obtusely acuminate, rounded or subcordate at base, more or less crenate-serrate, often obscurely and distantly, the marginal glands lacking or minute; flowers yellowish-green, the pubescent calyx 1.5–2 mm. long including the 1 mm. long lobes which are equaled by the petals; capsule wings 8–9 mm. broad, the axis about 5 mm. high, the seed 2.5–3 mm. long.—After Fawcett and Rendle. Perhaps not in Peru in typical form but understanding of the group to which it belongs needs monographic work with modern methods. *G. domingensis* var. *heterocarpa* Ktze. with fruits

obscurely if at all alate seems to be represented by *Williams 8042*. *Schunke 274* may be *G. Ulei* Pilger if that is distinct. Illustrated, Fawcett & Rendle, Fl. Jamaica 5: 73.

Loreto: Florida, Río Putumayo, *Klug 2361* (det. Standley). Mouth of Río Santiago, *Tessmann 4533; 4682*. Iquitos, *Williams 8042; Mexia 6392* (det. Standley). Río Mazán, *José Schunke 274*. "Chirapasacha" (Schunke). To Mexico; West Indies.

Gouania polygama (Jacq.) Urban, Symb. Ant. 4: 378. 1910. *Rhamnus polygamus* Jacq. Enum. Pl. Carib. 17. 1760. *G. tomentosa* Jacq. Sel. Stirp. Amer. Hist. 263. 1763.

Upper scandent or sprawling branches, leaves beneath and calyces more or less tomentose, the leaves sometimes sparsely or pilose; petioles usually 1–1.5 cm. long or the lower to 2.5 cm.; leaves ovate, the upper rounded or subtruncate or cordulate at base, mostly 5–8 cm. long, 3.5–6 cm. wide, the lower broadly ovate, to 1.5 dm. long, two-thirds as wide, cordate at base, all shortly acuminate, the tip itself obtusish, mucronate; serrations uneven, often serrate and rather obscure, the glands or calluses ordinarily closed; racemes in the upper axils and terminal often forming ample panicles; calyx 1.5 mm. long, the pedicels in fruit scarcely as long; fruits to 14 mm. broad, the axis 3–4 mm. high, glabrate or the body pubescent, the hard wings subrotund.—It is possible that one or more of the four herbarium names proposed for some of the following specimens will be found to indicate at least variants but Urban in herb. referred the two by Reissek and one of the two by Ruiz & Pavón to *G. tomentosa* as a variant. F.M. Neg. 5857 (ined. name).

Huánuco: Pampayacu, Río Chinchao, *5121*. Pozuzo, *4655; Ruiz & Pavón*.—Junín: La Merced, *5233; 5236*. To Mexico; West Indies.

Gouania trichodonta Reiss. in Mart. Fl. Bras. 11, pt. 1: 108. 1861.

Habit of *G. aptera* branchlets ferrugineous pubescent especially on the angles; leaves broadly elliptic or subovate-elliptic, acuminate, dentate-crenate, 5–7 cm. long, 3–5 cm. wide, the glandular teeth minutely fasciculate-pubescent, early pubescent on both sides, finally glabrous above, lateral nerves 6, veins obscure; spikes densely flowered; calyx appressed pubescent, 2 mm. long, little exceeding pedicel; disk elevated, the lobes nearly two times shorter

than calyx segments.—Kuntze referred this to *G. domingensis* var. *pubescens* (Poir.) Ktze., that is to *G. lupuloides*, and indeed there seem to be specimens intermediate in character. Illustrated, Reissek l.c., *pl. 26, fig. 3* (leaf). F.M. Negs. 32601; 23291 (as *G. alnifolia*).

Loreto: Yurimaguas, *Poeppig 3078*, type. Lower Río Nanay, *Williams 358* (det. R. Gross). Mishuyacu near Iquitos, *Klug 1354* (det. Standley). "Granadilla" (Williams). Bolivia.

VITACEAE. Grape Family

Reference: Planchon in DC. Monogr. Phan. 5. 1887.

Scandent (Peru) mostly by tendrils, the scabrous nodose or articulate branchlets soon or tardily ligneous, the sap watery. Leaves alternate (unless the lower), entire to variously lobed or foliolate, usually palmately or pinnately compound, pellucid-punctate dots frequently present, always with petiole articulate at base and often dilated with 2 free stipules. Flowers small, commonly 4–5-merous, hermaphrodite or unisexual, variously borne but often in a compound thyrse, the peduncles ordinarily cirriferous and opposite the leaves. Calyx cupuliform, sometimes entire. Stamens opposite the caducous free or calyptrately united petals, included at the base of the disk, this various in form, mostly intrastaminal. Ovary cells 2–6, 1–2-ovuled; style short, slender or none. Fruit baccate, sometimes only 1–2-celled and more or less juicy-pulpous with 1–4 seeds.

Besides "uva" the grape, and the beneficent beverages and other products it yields, the family is well known especially in northern climes for ornamental vines, as Virginia Creeper (*Parthenocissus tricuspidata* (Sieb. & Zucc.) Planchon, and is often referred to as the Vine Family.

The Peruvian species are here regarded as belonging to a genus distinct from *Vitis*, the latter principally in temperate regions and having the petals united and calyptrately deciduous.

CISSUS L.

Character of the family but the cymose corymbose flowers always 4-parted, hermaphrodite, the petals free or early lightly cohering. Disk cupulate, 4-lobate, adnate to the base of the 2-celled ovary. Fruit 1–2-seeded, not edible.

Leaves all simple.....*C. sicyoides.*
Leaves compound unless the uppermost.

Leaflets entire or serrulate.

Leaves in part 5-foliolate, the leaflets equally cuneate to base. *C. granulosa.*

Leaves 3-foliolate, the lateral obliquely rounded at base.

Stems sometimes alulate but not at all crenulately.

Leaflets sessile or the terminal cuneately petiolulate, obovate-lanceolate, usually obtuse or acute..*C. erosa.*

Leaflets often all well-petiolulate, acuminate, the terminal rhombic.....*C. rhombifolia.*

Stems strongly crenulate-alate.....*C. ulmifolia.*

Leaflets irregularly lobed or lobate.....*C. gongylodes.*

Cissus erosa Richard, Act. Soc. Hist. Nat. Paris 1: 106. 1792; 548. *C. salutaris* HBK. Nov. Gen. & Sp. 5: 225. 1822. *C. quadrialata* HBK. l.c. *Vitis salutaris* (HBK.) Baker in Mart. Fl. Bras. 14, pt. 2: 211, *pl. 52.* 1871. *V. erosa* (Richard) Baker, l.c. 210.

Typically glabrous except the somewhat strigose usually long-peduncled inflorescences, the slender stems acutely tetragonous-sulcate or narrowly alate; leaflets 3, subsessile or the terminal cuneately petiolulate, the lateral oblique at base, all oblong- or ovate-lanceolate, obtuse or acutish or even shortly acuminate, mucronulately crenate-serrulate or subentire, drying firm-chartaceous, lustrous, somewhat rufescent, the rather few nerves and many reticulate veins prominent; inflorescences including the peduncles crimson, or the flowers rarely white; fruits globose-ovoid, about 6 mm. long.—The var. *salutaris* (HBK.) Planchon, l.c. is more or less hirtellous, especially the leaf-nerves, and apparently often with stouter stems; the leaflets are obtuse as in the type by Leblond from French Guiana, or acute. The interpretation of the species may be open to question. Illustrated, Mart. Fl. Bras. 14, pt. 2: *pl. 52.* F.M. Neg. 23806.

San Martín: Juanjuí, *Klug 4258* (det. Standley, *C. rhombifolia*). Tocache, *Poeppig* (det. Herb. Wien, *C. quadrialata*).—Huánuco: Below Tingo María, *Stork & Horton 9540* (det. Standley, *C. salutaris*). —Junín: Satipo, *Soukup 2849.*—Loreto: Florida, Río Putumayo, *Klug 2092.* Río Mazán, *José Schunke 64* (var., det. Standley).—Cuzco: *Gay* (det. Planchon).—Ayacucho: Near Río Apurímac, *Weberbauer 5634.* "Navarría" (Schunke). To Mexico and the West Indies.

Cissus gongylodes (Baker) Burchell ex Planchon in DC. Monogr. Phan. 5: 550. 1887. *Vitis pterophora* Baker in Mart. Fl. Bras. 14, pt. 2: 213. 1871. *V. gongylodes* Baker, l.c. 209.

Tetragonous lower stems extraordinarily crenulate-alate or the angles of the wings deeply crisped; leaflets 3 with one or more angled lobes, the subsessile intermediate often trilobed, all rhomboid, puberulent-pilose on the nerves, the lateral sessile or petiolulate (Peru); cymes many-flowered, short-corymbiform; corolla depressed globose, glabrous, the reddish-brown petals finally expanding.—The Peruvian plant referred here by Baker was given an herbarium name by Poeppig and seems to be at least a variant, since the lateral leaflets are long- (1.5 cm.) petiolulate; it may become var. **lobata** [Poeppig] Macbr., var. nov., foliolis lateralibus longe petiolulatis. *C. spinosa* Camb. 549, related but lightly lobate, might be represented by my *4706* from Pozuzo but the incomplete material shows only spine bases; the obovoid fruits are 12 mm. long, nearly 10 mm. thick at apex. Illustrated, Pflanzenfam. ed. 2. 20D: 274. *fig. 80.*

Loreto: Yurimaguas, *Poeppig 2273* (type, var. *lobata*, herb. Vienna). Brazil.

Cissus granulosa R. & P. Fl. Peruv. 1: 64, *pl. 101*. 1798; 555.

Among Peruvian species well-marked by the mostly 5-foliolate leaves and the usually conspicuously granulate-tuberculate older branches, the smooth younger obscurely 4-margined; leaflets sessile or subsessile, cuneate-obovate, apiculate at the rounded or barely acute tip, minutely serrulate, fleshy, 4–7 cm. long, 2–2.5 cm. wide, finely reticulate-veined beneath; cymes dichotomously divided, sometimes ample, often shorter than the leaves; calyx repandly lobed; petals ovate-oblong, finally spreading, about 3 mm. long; fruit globose, to nearly 10 mm. in diameter.—Completely glabrous unless for an obscure puberulence on the slender pedicels. My collections on low sunny shrubs or trailing on slide rock. F.M. Negs. 9780; 18235.

Huánuco: Yanano, *3726; 3781*.—Junín: Huasahuasi, *Ruiz & Pavón*, type.—Ayacucho: Yanamonte, 2,700 meters, *Weberbauer 5646*.—Loreto: Yurimaguas, *Poeppig 2457*.

Cissus rhombifolia Vahl, Eclog. Amer. 2: 10. 1798; 544. *C. obliqua* R. & P. Fl. Peruv. 1: 65, *pl. 101*. 1798. *Vitis rhombifolia* (Vahl) Baker in Mart. Fl. Bras. 14, pt. 2: 207. 1871.

Much like *C. erosa* but the stems striate-sulcate, not alate, and, especially the leaflets often all abruptly long-petiolulate, or maybe typically the lateral subsessile, more or less acutely acuminate, often reddish hirtellous especially on the rather prominent nerves beneath, the reticulate venation much less marked, sometimes glabrescent; flowers umbellulately and densely congested, typically pubescent including the red petals.—*C. microcarpa* Vahl, 546, to be expected, seems to be scarcely distinguishable but is glabrous and said to have narrowly 4-alate branches, these angled above, the terminal leaflet long-, the lateral short-petiolulate. Type of *C. obliqua* with all leaflets long-petiolulate, maybe a variety, glabrous except for a few long appressed trichomes, according to Ruiz & Pavón found at Huánuco, Tarma, Huariaca, Rondos, Chablan and Chaucha. F.M. Neg. 18238 (*C. obliqua*).

Tumbez: East of Hacienda Chicama, *Weberbauer 7663*.—Cajamarca: On stone walls, Chota, *Stork & Horton 10039* (det. Standley).—San Martín: Chazuta, *Klug 4053* (det. Standley).—Huánuco: Chicoplaya, *Ruiz & Pavón*.—Junín: Near Tarma, *Ruiz & Pavón*, type. Near Palca, *Stork 10973*.—Loreto: Near Iquitos, *Klug 1146*. Río Mazán, *José Schunke 340* (det. Standley).—Cuzco: Prov. Quispicanchis, *Vargas 7762*. Machupicchu, *Vargas 6744*. "Sapohuasco" (Schunke). To Mexico and the West Indies.

Cissus sicyoides L. Syst. Nat. ed. 10: 897. 1759; 521. *Vitis sicyoides* Morales in Poey, Repert. Fis.-Nat. Cuba 1: 206. 1866. *C. umbrosa* HBK. Nov. Gen. & Sp. 5: 223. 1822. *C. canescens* Lam., Illustr. 1: 331. 1791. *C. compressicaulis* R. & P. Fl. Peruv. 1: 64, *pl. 100*. 1798.

Scandent or creeping, the branches terete or compressed, tuberculate or smooth, striate, the leaves cordate-ovate or oblong, sometimes abruptly and cuneately contracted at base, sometimes subhastate, acutely acuminate or obtusish, somewhat denticulate, rarely incised-lobate, thick-membranous, glabrous or especially beneath more or less pubescent; cymes corymbiform, shortly peduncled, umbellately and dichotomously divided, the small flowers greenish-yellow, white or purplish, the obovoid-globose fruits 1-seeded.—After Planchon, who interpreted the name as applicable to a single species highly variable in leaf-serration, -indument and -form as well as in size of flowers; he has listed a dozen or so of the scarcely recognizable variations as forms and among those that are cited as occurring in Peru are formas *morifolia*

Planchon, 525, *umbrosa* (HBK.) Planchon, 530, *canescens* (Lam.) Planchon, 531, and *compressicaulis* (R. & P.) Planchon, 531; the first is said to have terete glabrous branchlets and short petioles, the second tetragonous hirtellous branchlets, the third and fourth more or less canescent pubescent, the latter with more prominent serration but the character is certainly intangible. However, Svenson, Amer. Journ. Bot. 33: 463. 1946, observed two distinct forms in the vicinity of Guayaquil, Ecuador, one apparently forma *compressicaulis* with thin petals 1.5 mm. long and rotund anthers only 0.5 mm. long, the other quite glabrous, with thickened petals 2 mm. long and elongate anthers 1 mm. long. Therefore there may be some genetic characters that will require a revision of the present understanding of this plant. However, in at least one herbarium specimen, glabrous or glabrate, the anthers have appeared to be at least subrotund. Determinations mostly by Standley, only a few of the many collections cited. As presently understood the plants vary also in habit and size from vigorous lianas to slender creepers, depending in part at least on age and habitat, which ranges from sandy beaches to shrubby thickets and tall forests, the stems however apparently always flexible and therefore serving as cords and for baskets. When high-climbing, bundles of long cord-like fibers are developed and reach finally to the ground where they often take root; indeed any part of the plant may survive when cut. The leaves supply a soap-like lather if rubbed in water.—F.M. Negs. 23808 (*C. compressicaulis*); *35989* (*C. umbrosa*).

Tumbez: Southeast of Hacienda La Choza, *Weberbauer 7703* (f. *compressicaulis*).—San Martín: San Roque, *Williams 7473*. Lamas, *Williams 6339*. Tarapoto, *Williams 5440; 5853; 6172*. Juan Guerra, *Williams 6839*.—Ancash: Santa, *Stork & Horton 9155* (det. Johnston).—Huánuco: Chacahuasi, Vitoc, *Ruiz & Pavón* (type, f. *compressicaulis*). Churuplaya, *Mexia 8253* (f. *compressicaulis*). Tingo María, *Stork & Horton 9465; Allard 20373* (det. L. Smith). Pampayacu, *Poeppig 2126*. Pillao, *Ruiz & Pavón* (forma).—Lima: Near Lima, *Dombey; Jussieu; Gaudichaud* (f. *canescens*). Chancay, *Ruiz & Pavón* (type, *C. compressicaulis*). Callao, *Soukup 2134* (f. *compressicaulis*).—Junín: La Merced, *5255; 5560; Killip & Smith 23694* (f. *morifolia*).—Loreto: Lower Río Nanay, *Williams 256; 289; 458*. Iquitos, *Williams 8001; 3531; 7906; 1393; Klug 1513; 1514*. Río Paranapura, *Klug 3938*. Pumayacu, *Klug 3229*. Creek Carapisa above Pongo de Manseriche, *Mexia 6256* (f. *umbrosa*); *6178; 6170*. Near Yurimaguas, *Klug 2817;*

Williams 5155; 4995; 4476; 4408. Florida, *Klug 2066; 2352.* Caballo-Cocha, *Williams 2291; 2428.* Leticia, *Williams 3150.*—Lambayeque: Chiclayo, *Stork 11431; West 3579* (det. Johnston).—Ayacucho: Near Kimpitiriki, Apurímac Valley, *Killip & Smith 23024; 23033.*—Cuzco: Valle del Urubamba, 2,200 meters, *Herrera 3312.* To Mexico and the West Indies. "Ampato-huasca" (Williams); "zapo-huasca" (Mexia); "yedra" (Ruiz & Pavón); "paja de la culebra" (West).

Cissus ulmifolia (Baker) Planchon in DC. Monogr. Phan. 5: 552. 1887. *Vitis ulmifolia* Baker in Mart. Fl. Bras. 14, pt. 2: 213. 1871.

Glabrous or essentially except the puberulent peduncles and pedicels; stems terete, multistriate and with 4 strongly crisped wings; leaflets 3, coriaceous, lustrous above, reticulate-veined, acute or obtuse, oblong-elliptic or the terminal subobovate, mostly 8–10 cm. long, about half as wide, minutely serrulate, all well-petiolulate, rarely sessile; corolla glabrous.—Climbing tangle along bank and open places, the flowers crimson, mature fruit black (Mexia). F.M. Neg. 32627.

Loreto: Yurimaguas, *Poeppig Addenda 22,* type. Mishuyacu, *Klug 929.* Above Pongo de Manseriche, *Mexia 6317* (det. Standley). "Sapohuasco colorado" (Mexia).

TILIACEAE. Linden Family

References: Burret, Notizbl. Bot. Gart. Berlin 9: 592–880. 1926; Schumann in Mart. Fl. Bras. 12, pt. 3: 119–200. 1886.

Trees, shrubs or infrequently more or less suffrutescent herbs with alternate entire, serrate or rarely lobed often stellate pubescent leaves. Stipules conspicuous in *Vallea.* Flowers hermaphrodite or hermaphrodite and pistillate, sometimes involucrate. Sepals usually 4 or 5, valvate, the usually imbricate petals as many or rarely reduced or wanting. Stamens numerous (exceptionally 100), free or shortly connate, the anthers 2-celled, at least finally opening longitudinally or apically (*Sloanea*). Ovary free (rarely inferior), 2–many-celled (rarely 1-celled by abortion), each cell with 2–many ovules. Style simple or more or less divided at tip; stigma sometimes sessile. Fruit dry, often rough or even spinose, dehiscent or indehiscent.—R. Weibel, Candollea 10: 155–177. 1945, in his careful study of the placentation in this family has verified the existence

of the parietal and concluded that *Mollia* and *Goethalsia* are genera properly placed here.

For convenience the family *Elaeocarpaceae*, by many students treated as distinct, is included here; C. Earle Smith, Jr., Contr. Gray Herb. 175: 3. 1954, summed up the relationship as follows: the family is a somewhat arbitrary assemblage of genera, mostly removed from the *Tiliaceae* because they lack the mucilage ducts common to the members of that family; some of the characters suggest affinities with the *Sterculiaceae* and the *Malvaceae*. Smith found that about a third of the unidentified specimens of "*Sloanea*" examined in herbaria belonged to the *Flacourtiaceae;* the latter however have petaliferous flowers and rather thin-walled, usually many-seeded fruits.

Interesting family as the source of hemp (jute) and other valuable fibers (*Triumfetta, Corchorus*).

Perennials, often suffrutescent below; fruit a linear capsule; flowers small, yellow.....1. *Corchorus.*

Shrubs, the stems and branches slender, virgate; fruit a prickly bur; flowers yellow.....2. *Triumfetta.*

Trees or more or less arborescent shrubs; fruit sometimes armed but not as above.

Leaves 3 (–7)-nerved from base (including midnerve), sometimes pinnately nerved above base; anther dehiscence longitudinal or early by apical chink.

Stipules wanting or small or caducous (subpersisting in *Apeiba tibourbou*).

Leaves cordate-ovate, angulate-lobulate; flowers many, small (except *T. calycina*); fruit finely bristly.

Fruit a bristly bur; flowers 1–2 (3), bracteolate. 2. *Triumfetta.*

Fruit disciform, bristle fringed; flowers in 3's (2's), often ebracteolate.....3. *Heliocarpus.*

Leaves entire or serrate; flowers few, medium size; fruits various, never quite as above.

Flowers not involucrate; capsules alate, tubercled or bristly (unknown for *Neotessmannia*).

Leaves slightly if at all oblique; ovary superior, 1–many-celled.

Capsules not alate, opening by a central hole or at top with woody teeth; anthers appendaged.4. *Apeiba.*

Capsules alate apically, semi-bivalved; anthers not appendaged.....5. *Mollia.*

Leaves strongly oblique; ovary inferior, multicelled below.....8. *Neotessmannia.*

Flowers (each) early enclosed in a parted or calyciform involucre; capsules ligneous, not alate apically, smooth, 5-valved.

Involucre divided; anthers connate, opening longitudinally.....6. *Luehea.*

Involucre cupulate; anthers divaricate above, early opening by a chink.....7. *Lueheopsis.*

Stipules conspicuous, persisting (sometimes absent in *Vallea* on fertile branches; *Apeiba tibourbou* has tardily deciduous stipules).

Fruit dry; stipules subrotund.....9. *Vallea.*

Fruit fleshy; stipules linear.....10. *Muntingia.*

Leaves pinnately nerved from base; anthers often opening by an apical chink.....11. *Sloanea.*

1. CORCHORUS [Tourn.] L.

More or less suffrutescent herbs frequently hirsute with simple trichomes, rarely stellulate, the leaves serrate, the shortly peduncled almost subsessile 1–few-flowered bracteate inflorescences opposite them or in the axils. Sepals and yellow petals 5 (4). Stamens usually many, all antheriferous. Ovary 2–5-celled, many-ovuled; style short the dilated stigma crenulate. Capsules elongate-linear and smooth or rarely subglobose and muricate, 2–5-ovuled, sometimes septate between the numerous pendulous or horizontal seeds. Weibel, Candollea 10: 173. 1945, confirmed the observation of Payer that the ovary is 1-celled in bud.

Two similar Asian species (*C. clitorius* L. and *C. capsularis* L.) are the source of the important fiber, jute.

Sepals at most 4 mm. long; capsules narrowly 3-winged, with 3 finally horizontal apical horns.....*C. aestuans.*

Sepals longer than 4 mm.; capsules beaked or 4-apiculate.

Capsules acuminate-beaked; herbs or ligneous toward base.

Capsules and usually stems hirsute, the trichomes spreading. *C. hirtus.*

Capsules and often stems glabrate, the trichomes appressed or obscure..... *C. orinocensis.*

Capsules obtuse but minutely 4-apiculate; shrubby species. *C. siliquosus.*

Corchorus aestuans L. Syst. Nat. ed. 10, 1079. 1759. *C. acutangulus* Lam. Encycl. 2: 104. 1786.

Annual or perennial herb, the stem sometimes woody at base, glabrate or pilose; leaves ovate to rounded, more or less acute, crenate, the 2 lowest serrations now and then bristle-tipped; sepals 3–4 mm. long, cucullate at tip, equaled by the obovate petals; capsules glabrous, 3-celled, 6-angled with 2 or 3 of the angles winged, the beak with 3 entire or bifid horns.

Peru (probably). Widely distributed in tropical regions.

Corchorus hirtus L. Sp. Pl. ed. 2, 747. 1762. *C. pilolobus* Link, Enum. Hort. Berol. 2: 72. 1822.

Similar to *C. orinocensis* but more or less hirsute with spreading trichomes this indument extending to the capsules these often curved near the base and compressed; leaves ovate to lanceolate-oblong, rarely 5 cm. long, obtuse to acuminate; sepals pilose, 6 mm. long, the petals about as long.—Many Peruvian specimens referred here seem to belong rather to the related species which perhaps should be treated as a variety, as by Schumann.

Lima: Huara, *Ruiz & Pavón* (det. Burret).—Loreto: Río Paranapura, *Klug 3960*, in part. Yurimaguas, *Poeppig 2098*. American tropics.

Corchorus orinocensis HBK. Nov. Gen. & Sp. 5: 337. 1823. *C. hirtus* L. var. *orinocensis* (HBK.) Schuman in Mart. Fl. Bras. 12, pt. 3: 127. 1886. *C. mompoxensis* HBK. l.c. 339, fide Dahlem Herb.

Usually erect, sometimes 2.5 meters tall, often woody below and with 1–2 or few branches, sometimes a marsh herb, generally glabrate but the stems early lineately puberulent; leaves ovate to lanceolate, or narrowly elliptic, 3–10 cm. long, acute to acuminate; stipules filiform; sepals 6 mm. long or longer; ovary 3-celled; capsules straight or nearly, sparsely appressed puberulent or almost glabrous, with erect beak and transverse partitions.—Illustrated, Fawcett & Rendle, Fl. Jam. 5: 86. F.M. Negs. 9493; 35423.

Piura: Serrán, *Weberbauer 5991.*—San Martín: Waste land, Tarapoto, *Woytkowski 35050* (det. Cuatrecasas); *Williams 5582* (det. *C. pilobulus*, Standley); *Spruce 4289.* Pongo de Cainarachi, *Klug 2736* (det. Standley).—Libertad: *Raimondi* (det. Burret).—Junín: La Merced, *5225.*—Loreto: Balsapuerto, *Klug 2841* (det. Standley, *C. pilobulus*). Río Paranapura, *Klug 3960*, part. Yurimaguas, *Williams 4166; 4463; 5011; 5041.* To Texas and the West Indies. "Espada pichana" (Williams).

Corchorus siliquosus L. Sp. Pl. 529. 1753.

A more or less shrubby herb sometimes a meter or two high, marked in fruit by 2-celled capsules obtuse but minutely apiculate with 4 teeth; leaves only 1–4 cm. long, puberulent or glabrate, ovate or oblong-lanceolate, acute or obtuse; sepals linear, about equaled by the petals, these 5–6 mm. long; capsules glabrous but lineately puberulent at the edges of the valves, not transversely septate.—A specimen from near Lima by Ruiz & Pavón referred here by the collectors was determined at Madrid by Burret as *C. hirtus;* however, it is without the fruit, diagnostic, and the species is probably within Peru.

Peru (see note above). South America to Mexico, Florida and the West Indies.

2. TRIUMFETTA [Plum.] L.

Reference: Ko Ko Lay, Ann. Mo. Bot. Gard. 37: 315–395. 1950.

Suffrutescent stellate-pubescent (at least some trichomes) tall herbs or slender shrubs, the usually small yellow or brownish-yellow flowers axillary and few or fasciculate or sometimes disposed in an elongate cylindrical inflorescence with or without bract-like leaves. Sepals 5, as petals, or these rarely reduced or wanting, glandular or foveolate at base. Stamens ordinarily many above the commonly 5-glandular elevated torus or gonophore that supports the 2–3 (5)-celled spinulose ovary, each cell with 2 anatropous collateral pendulous ovules; style filiform, the stigma entire or shortly 2–3-parted. Capsules subgolobose, echinate-spinose, indehiscent or separating into two or three 2-seeded cocci or finally falsely 5–10-celled, each cell 1-seeded, exceptionally 1-celled, 1-seeded by abortion.—Honors John Baptiste Triumfetti of Bologne, physician and director of the Rome Botanic Garden.

Several species supply a fiber similar to hemp. My indebtness to the exactingly executed and intelligent revision of Ko Ko Lay

will be apparent, but it seems to me that when the evidence is all in fewer entities, probably with more variations, will be recognized.

Flowers large, distinctly longer than 2 cm.; fruit spines 1–2 mm. long, minutely pubescent..... *T. calycina.*

Flowers about 1 cm. long (rarely 2 cm.), usually shorter; fruit spines retrorsely hispidulous to glabrous, 3–6 mm. long.

Leaves green, usually soon glabrescent, the trichomes often mostly simple.

Indument of leaves scattered, stellate; flowers 14–18 mm. long. *T. grandiflora.*

Indument sparse but rather even, mostly simple; flowers 8–13 mm. long..... *T. bogotensis.*

Leaves more or less canescent, at least beneath, with stellate or mostly stellate trichomes.

Buds about 1 cm. long (8–11 mm.), appendage 1 mm. long; leaves with some simple trichomes..... *T. abutiloides.*

Buds shorter than 1 cm. (5–8 mm.), appendages obsolete or often 2 mm. long or longer; trichomes all stellate.

Leaves obviously 4-glandular at or near sinus; fruit body 6–8 mm. thick; spines many..... *T. althaeoides.*

Leaves eglandular or not obviously 4-glandular; fruit body 3–5 mm. thick; spines 75 or fewer except *T. Bartramia.*

Petals as gonophore developed, the latter at least 0.5 mm. long.

Sepals deeply cucullate; gonophore short; tomentose fruit body 3–4 mm. thick; spines glabrous or essentially..... *T. Bartramia.*

Sepals appendaged or not deeply cucullate; gonophore obvious, 5-glandular; spines hispidulous.

Sepal appendages to 2 mm. long; fruit body pubescent, 3–5 mm. thick, spines 75..... *T. semitriloba.*

Sepal appendages 3 mm. long; fruit body tomentose, 2–3 mm. thick; spines 25–40..... *T. oligacantha.*

Petals as gonophore absent or obsolete; fruit body about 3 mm. thick, lightly stellate; spines hispidulous, about 50..... *T. Lappula.*

Triumfetta abutiloides St. Hil. Fl. Bras. Merid. 1: 287. 1827; 365.

Allied and in general similar to *T. bogotensis* but the indument at least in part tomentose, the simple trichomes often gland-tipped, the stellate approximate, the sepal appendages only about 1 mm. long, and, especially, the mature fruit with six 1-seeded cells, the septa false, the spines 100 or more; terminal leaf-lobe long-acuminate, lateral lobes usually obtuse; petals 7–10 mm. long; stamens 20, the filaments retrorsely serrulate; fruit body somewhat pubescent, in Peru often nearly glabrous, 3–5 mm. thick.—Determinations mostly by Lay, as elsewhere. I am not entirely convinced that the species is in Peru. F.M. Neg. 35401.

Lima: Chosica, *497* (distr. as *T. semitriloba*).—Huánuco: Near Huánuco, *2053; 3521* (det. Macbride, *T. semitriloba*); *Ruiz & Pavón.* Puente Durand, *Stork & Horton 9572* (det. Standley, *T. semitriloba*). Cuchero, *Poeppig 1448.*—Loreto: Mishuyacu, *Killip & Smith 29894.* —Cuzco: At 700 meters, *Bües.* Marcapata, *Vargas 3079.* Torontoi, *Cook & Gilbert 819.* Santa Ana, *Cook & Gilbert 1437.* To Colombia, Haiti, Argentina and Brazil. "Rata-rata" (Bües).

Triumfetta althaeoides Lam. Encycl. 3: 420. 1791; 371. *T. semitriloba* Jacq. f. *althaeoides* (Lam.) Uittien in Pulle, Fl. Surinam 3: 56. 1932.

Openly growing bush sometimes a couple of meters high more or less ferrugineous-tomentose the trichomes all stellate, the leaves obscurely if at all 3-lobed and with 4 conspicuous glands at the shallowy cordate basal sinus the rather regular serrations also there usually glandular; petioles 4–6 cm. long; leaves ordinarily at least 1 dm. long, nearly as wide; cymes of 3–4 cymules or terminal branches, peduncles 3–5 mm. long; pedicels 1–2 mm. long; flowers hermaphrodite, the buds about 6 mm. long, apical appendages 1 mm. long or nearly obsolete; sepals 6–7 mm. long; petals linear, 3–4 mm. long; gonophore stout, about 0.75 mm. long, the glands small; urceolus less than 0.5 mm. high, 5-lobed; stamens 20, filaments 6-serrate; fruit body 6–8 mm. in diameter, sparsely stellate, 4–5-celled, later falsely 8-celled, not more than 6 seeds maturing; spines about 200, to 3 mm. long, retrorsely pilosulous; seeds pyriform, about 2 mm. long, 2.5 mm. broad.—Illustrated, Ko Ko Lay, l.c. 372.

Loreto: Near Iquitos, *Williams 1401; 7950; 7958; Tessmann 3592* (det. Burret, *T. semitriloba*). Mishuyacu, *Klug 1086; 1289.* Balsapuerto, *Klug 3054.* Purubana, *Williams 1316; 1324.* Río Nanay,

Williams 445. Río Itaya, *Williams 138.* Near Caballo-Cocha, *Williams 2062; 2063; 2064.* To Trinidad. "Caballosa" (Tessmann).

Triumfetta Bartramia L. Syst. Nat. ed. 10: 1044. 1759; 382. *T. indica* Lam. Encycl. 3: 420. 1791? *T. rhomboidea* Jacq. Enum. Pl. Carib. 22. 1760, fide Fawcett & Rendle. *Bartramia indica* L. Sp. Pl. 389. 1753.

Shrub, a meter tall or taller, the older branches glabrous and conspicuously white-lenticellate, the younger densely and shortly stellate-tomentose as the slender petioles, these 3–5 cm. long; leaves broadly ovate to rhombic-ovate, obscurely to deeply 3–5-lobed, usually 4–5 cm. long and nearly as wide, sometimes 7–8 cm. long, 6–7 cm. wide, obtuse or rounded at base where rarely glandular, abruptly acuminate, nearly glabrate or with scattered coarse short trichomes; cymes of 3–5 cymules axillary, peduncles 1–2 mm. long, pedicels 1 mm. long; flowers hermaphrodite, the buds most expanded at apex; sepals deeply cucullate, 5–7 mm. long, lightly stellate or glabrate; petals broadly obovate, about 5 mm. long; gonophore very short, glands small, urceolus deeply many-lobed; stamens 10–15, filaments with 4–6 retrorse serrations; fruits in dense nodose clusters, the densely tomentose body about 3–4 mm. in diameter, (2) 3-celled, the cells 1–2-ovuled, 1-seeded, the 75–100 spines 1–1.5 mm. long, nearly or quite glabrous.—Following the classification specialists have established in the Malvaceae this is a generic type, since the fruit is not naturally dehiscent. Illustrated, Mart. Fl. Bras. 12, pt. 3: *pl. 27.*

San Martín: Tarapoto, *Williams 5925.*—Loreto: Iquitos, *Killip & Smith 27229.* Puruchana, *Williams 1314.* New and Old World tropics.

Triumfetta bogotensis DC. Prodr. 1: 506. 1824; 366. *T. Jelskii* Szyszyl. Diss. Math. Nat. Acad. Litt. Cracoy [Krakow], 29: 224. 1895?

A meter or two high, the indument mostly stellate and long single trichomes mixed, the latter predominant or alone on the long branches, in the inflorescence axils and on the sepals without; petioles tomentose, 4–6 cm. long; leaves broadly ovate, usually 3-lobed, to about 1 dm. long, 8 cm. wide, rounded to subcordate at base, acuminate, irregularly serrate, the simple trichomes of the pubescence appressed; cymes axillary, peduncles 4–7 mm. long, pedicels 3–4 mm. long; flowers hermaphrodite, buds oblongoid, constricted below the slender apical appendages, these 2–3 mm.

long; sepals oblong, 8–13 mm. long; petals broadly obovate, 8–9 mm. long, 3–4 mm. wide, claw densely plumose; gonophore slender, 1 mm. long, equaled by the glands, the short unlobed urceolus distinctly ciliate; stamens 25–30, the filaments not serrated; fruit body at maturity 3–4 mm. in diameter, 3-celled, the slender retrorsely pilosulous spines about 3 mm. long; seeds 6, lenticular, 2–3 mm. long, about 2 mm. wide.—The identity of *T. Jelskii*, allied by the author to *T. caudata* Tr. & Pl. of Colombia, incompletely known, the type not seen by Ko Ko Lay, is not certain ex char. but except for the "subsessile flowers" which may be due to undeveloped condition, the description seems to fit this species, the "laxly hirsute leaves" especially suggesting it.

Cajamarca: Cascas and Cutervo, *Raimondi* ("vel affine," Burret). Tambillo (*Jelski 280*, type, *T. Jelskii*).—Cuzco: San Miguel, *Cook & Gilbert 891*. Machupicchu, *Vargas 795*. Tropical America.

Triumfetta calycina Turcz. Bull. Soc. Nat. Mosc. 36: 574. 1863. *T. multilocularis* Hochr. Ann. Cons. Jard. Bot. Genève 18: 104. 1914?; 356.

Spreading shrub often forming clump or a small tree 2–4 meters high, densely stellate-tomentose, the more or less spreading trichomes rather ferrugineous; petioles 4–6 cm. long; leaves broadly ovate, narrowly acuminate, irregularly serrate, usually 3-lobed, to about 1 dm. long, 6–7 cm. wide; cymes axillary usually with only 1 cymule, peduncles 8–12 mm. long, pedicels about 6 mm. long; flowers hermaphrodite, the buds 22–25 mm. long, appendages 2–3 mm. long; sepals about 27 mm. with appendages; petals 24 mm. long, 4–6 mm. wide, the 4 mm. claw densely plumose; gonophore to 2 mm. long, the glands to 1.5 mm.; urceolus 10-lobed; stamens 25–30 (or sometimes 16?), the filaments retrorsely 2-serrulate; fruit body 6–8 mm. in diameter, lightly and deciduously stellate, 3–5-celled becoming 8–9-celled and -seeded, the many puberulent spines only 1–2 mm. long; seeds ovoid, about 2 mm. long and broad.—It may be an error to use Turczaninow's name, based on *Mathews 889* without data for this species, but, as Ko Ko Lay points out, the description agrees except that the author noted the stamens as 15 or 16; this is probably a slip of the pen or the printer since it seems unlikely that this distinctive plant, compared with *T. mollissima* HBK. of Colombia in herbaria, but that with smaller flowers, tomentose fruits, has not been found again with so few stamens. F.M. Neg. 23820 (*T. multilocularis*).

Ancash: Higaris, *2452.*—Huánuco: Yanano, *3809.* Acomayo, *Woytkowski 34013* (det. Cuatrecasas). Ambo, *3150.* Pampayacu, *Kanehira 112.* Near Huánuco, *Sawada P72; Ruiz & Pavón; Dombey.* Mito, *1571.*—Junín: Carpapata, *Killip & Smith 24361; Stork 10970; Ochoa 287.* Huacapistana, *Rose 18550; Sandeman 4469.* Ayacucho: Near Huanta, *Killip & Smith 22309.*—Apurímac: Abancay, *Goodspeed Exped. 10552.* Marcapata, *Vargas 9685.* San Miguel, *Cook & Gilbert 1126; 1163.* Machupicchu, *Vargas 796; West 6473; Soukup 143.*—Puno: *Soukup 521.* Sandía *Weberbauer 507* (as *T. macrantha*). Valle del Urubamba, *Herrera 962; 2653.* Prov. del. Cercado, *Weberbauer* (as *T. macrantha*). To Colombia. "Ratan," "r'ata-r'ata" (Vargas).

Triumfetta grandiflora Vahl, Eclog. Amer. 2: 34. 1798; 363. *T. Schunkei* Macbr. Candollea 5: 381. 1934?, fide Ko Ko Lay.

Shrub 2–4 meters high, the branches stellate-hirtellous or glabrate; leaves long-petioled, ovate or broadly ovate, large, cuspidate- or caudate-acuminate, rounded or subcordate at base, glandular-serrate, almost glabrous in age, early sparingly pubescent with small stiff stellate trichomes; sepals glabrate, 15–18 mm. long, about equaled by the linear-oblanceolate petals; capsules 1–1.5 cm. in diameter, nearly or quite glabrous including the many slender prickles.—After Standley and Steyermark, Fl. Guatemala, Fieldiana: Bot. 24, No. 6: 322. 1949. Perhaps should be interpreted to include *T. mollissima.* My plant was proposed primarily on the character of style entire, apparently found to be variable by Lay. The sepals and petals of this species were described as only about 12 mm. long, but they may be nearly 15 mm. long when moistened. F.M. Neg. 32620 (Poeppig).

Junín: Chanchamayo Valley, *Schunke 1597* (type, *T. Schunkei*). —Loreto: Yurimaguas, *Poeppig 2053.* To southern Mexico; West Indies.

Triumfetta Lappula L. Sp. Pl. 444. 1753; 378. *T. quinqueloba* Turcz. Bull. Soc. Nat. Mosc. 36, pt. 1, 1: 574. 1863, fide Lay. *T. heterophylla* Lam. Encycl. 3: 420. 1791. *T. Hostmanni* Miq. Linnaea 22: 466. 1849.

Slender, tall, frutescent, the often lax branches coarsely ferrugineous-tomentose, none of the trichomes simple; petioles elongate, sometimes nearly 1 dm. long; leaves broadly ovate, commonly somewhat pandurately 3–5-lobed, the unequal serrations usually

glandular, obtuse to rounded at base, the lobe-tip, at least the terminal, acuminate, often less than 1 dm. long, nearly as wide, sparsely pubescent above, more tomentose beneath; cymules usually only 2 in each axillary cyme, the flowering peduncles 2–3 mm. long, the pedicels shorter; flowers hermaphrodite, the medially constricted buds 3–5 mm. long, the very short appendages rarely wanting; sepals densely tomentose, 4–6 mm. long; petals undeveloped as gonophore and glands, the urceolus nearly obsolete; stamens 10 (rarely 5 or 15), the filaments smooth; fruit body about 3 mm. in diameter, sparsely stellate, 3- or sometimes 2-celled by abortion, the slender retrorsely pilosulous spines 2–3 mm. long.—The plant of Lamarck with body of fruits 2–2.5 mm. thick may be a variant, apparently the common form in Peru; it is considered distinct by Fawcett & Rendle, Fl. Jamaica 5: 84. 1926. Illustrated, Ko Ko Lay, l.c., 378; Mart. Fl. Bras. 12, pt. 3: *pl. 27* (*T. heterophylla*). F.M. Neg. 23817 (*T. Hostmanni*).

San Martín: Chazuta, *Klug 4150* (det. Standley).—Junín: La Merced, *Killip & Smith 23419* (det. Standley).—Amazonas(?): (*Mathews 1625*, type, *T. quinqueloba*).—Loreto: Balsapuerto, *Klug 3093* (det. Standley, *T. semitriloba*). Iquitos, *Killip & Smith 27234* (det. Macbride, *T. rhomboidea*). Bolivia to the West Indies; western Africa.

Triumfetta oligacantha Hochr. Ann. Cons. Jard. Bot. Genève 18: 106. 1914; 377.

Closely resembles *T. semitriloba* but the leaves not lobed, caudate-acuminate, rather regularly serrate; peduncles 8–10 mm. long, pedicels 3–5 mm. long, sepal appendages about 3 mm. long, stamens about 30, the filaments smooth, and, especially, fruits with 3 cells each 1-seeded and spines only 25–40.—It seems probable that the type, as many labeled simply *Pavón*, was actually collected by Tafalla, particularly since the species is otherwise known from the region of Guayaquil.

Peru(?): Without data, *Pavón*, type. Adjacent Ecuador.

Triumfetta semitriloba Jacq. Enum. Pl. Carib. 22. 1760; Sel. Stirp. Amer. Hist. 147. 1763; 373.

Suffrutescent, the older indument including that on the leaves rather scabrous, short and entirely of stellate trichomes, early often abundant and more or less tomentose; petioles 3–6 cm. long, the trichomes in separate tufts; leaves usually broadly ovate but vari-

able, often more or less 3-lobate and only the terminal lobe acuminate, sometimes also the lateral, ordinarily to about 8 cm. long, 6 cm. wide; serrations commonly glandular, always very unequal; cymes rarely terminal, with 2–3 cymules, peduncles and pedicels 2–3 mm. long; flowers hermaphrodite, 5–8 mm. long, appendages 1–2 mm. long; sepals greenish, 6–10 mm. long, subequaled by the petals; gonophore less than 1 mm. long, urceolus scarcely half as long; stamens 15–25, the filaments 4-serrulate; fruit body 3–5 mm. in diameter, lightly to rather densely stellate, 3-celled, each cell 2-seeded but rarely 6-seeded, the 50–75 slender retrorsely hispidulous spines 2–3 mm. long.—Illustrated, Ko Ko Lay, l.c. 374.

San Martín: San Roque, *Williams 7160* (det. Standley, *T. Lappula*).—Junín: Chanchamayo Valley, *Raimondi* (det. Burret).—Loreto: Yurimaguas, *Williams 3950; 4360* (det. Standley). Widely distributed in the tropics.

3. HELIOCARPUS L.

Reference: Ko Ko Lay, Ann. Mo. Bot. Gard. 36: 507–541. 1949.

Stellate pubescent trees or shrubs with serrate usually somewhat 3-lobed leaves and small flowers in terminal or rarely axillary panicled cymes, these of hermaphrodite or pistillate flowers, the latter apetalous. Sepals free, 4 as the basally foveolate petals, these about the base of a more or less elevated torus, this 4-glandular below the many distinct stamens. Ovary 2-celled (falsely 4-celled at base), the cells pseudo-septate between the 2 ovules; style filiform, the stigma bidentate or biparted. Carpels small, compressed, with 2 series of plumose bristles, each cell with 1 pendulous seed, the endosperm oily.

Bark produces a strong durable fiber and the wood of the rapidly growing Peruvian species, according to Ruiz and Pavón, was favored for rafts. Seibert observed that it yields a latex of possible value.

Heliocarpus popayanensis HBK. Nov. Gen. & Sp. 5: 341. 1823; 532. *H. americanus* L. var. *popayanensis* (HBK.) Schum. in Mart. Fl. Bras. 12, pt. 3: 142. 1886. *H. stipulatus* Hochr. Ann. Cons. Jard. Bot. Genève 18: 121. 1914, fide Ko Ko Lay.

Older branches sparsely lenticellate, glabrate, the younger somewhat tomentose with stellate and simple trichomes, the long petioles densely; leaves more or less distinctly 3-lobed, often 1.5–2

dm. long, 14–18 cm. wide, finally deeply cordate, lightly stellate above, glabrate in age, usually densely stellate beneath the pubescence, on the nerves mostly simple; inflorescences commonly terminal, the hermaphrodite about a dm. long and slightly wider, the pistillate usually about 1.5 dm. long, 2 dm. wide; flowering peduncles 3-radiate; buds without appendages at sepal tip; sepals 5 mm. long, petals 4 mm. long, in pistillate flowers the former 3–4 mm. long, the latter wanting; stamens about 12; style shortly bifid, each stigma with 3 acute lobes; fruits ellipsoid to ovoid, slightly tomentulose or glabrate.—Leaves are frequently without lobes at the southern and northern limits of the range and present great diversity of shape and size, according to Ko Ko Lay, upon whose careful well-considered revision I have freely drawn with appreciation.

Sometimes 30 meters; flowers white, greenish-red or roseate. Wood used for rafts (Ruiz & Pavón).—Determinations, except as noted, by (or verified by) Lay. Illustrated, Ko Ko Lay, l.c., 533. F.M. Neg. 35443.

Cajamarca: Querocotillo, 2,000 meters, *Weberbauer 7124*. Nanchó, *Raimondi*.—San Martín: Moyobamba, 890 meters, *Klug 3627; Woytkowski 35317*. Tarapoto, *Spruce 4558*. Juanjuí, *Klug 4395*.—Junín: Vitoc, *Ruiz & Pavón*. Near La Merced, *Killip & Smith 23926* (det. Standley). Pichis Trail, *Killip & Smith 25864*. Chanchamayo Valley, *Schunke 290; 293; 1599*.—Huánuco: Near Huánuco, *Sawada 101*. Tocache, *Poeppig 1894; 3102* (type, *H. stipulatus* Hochr). Cuchero, *Dombey; Ruiz & Pavón*. Monzón, *Weberbauer 3432*. Muña, *4065*. Sunny brushy slope, near Pozuzo, *4765*.—Loreto: Yurimaguas, *Killip & Smith 28166; 27831; 27853; Williams 4297*. Balsapuerto, *Klug 3076*.—Cuzco: Prov. Convención, *Soukup 790*. San Miguel, *Cook & Gilbert 1072*.—Madre de Dios: Iberia, *Seibert 2029* (det. Killip).—Río Acre: Mouth of Río Macauhán, *Krukoff 5261*. Western South America. "Palo de balsa" or "huampo" (Ruiz & Pavón); "llausa-quiro" (Williams); "llaosa-pancho" (Cook & Gilbert); "yausu-quiru" (Woytkowski); "huampo blanco" (Sawada).

4. **APEIBA** Aublet

Reference: Uittien, Recueil. Trav. Bot. Néerl. 32: 244–251. 1935.

Trees or tree-like shrubs with ample 3–5-nerved leaves and greenish-yellow flowers disposed in 2–3-dichotomous cymes that are terminal or opposite the relatively short petioles. Sepals free, usually, as the short petals, 5, these smooth to base. Stamens

indefinite; filaments short; anthers erect, linear with a membranous connective produced apically. Ovary 10 (8) –many-celled, the cells many-ovuled; style simple. Fruit large, disk-like or depressed-globose, tubercled or coarsely bristly, coriaceous, dehiscing centrally, the numerous compressed seeds in a lustrous pulp.—Uittien in Pulle, Fl. Surinam 3, pt. 1: 438–440. 1941, revised his work in accord with the observations of Ducke, Archiv. Inst. Biol. Veg. Rio Jan. 4: 51–52. 1938. Neither of these able botanists, however, have succeeded in including exactly in their classifications the Peruvian examples of these interesting trees, suggesting that there are more species than they describe or fewer and these more variable.

Fruit covered with long hirsute or hispid bristles; branchlet tips and petioles long-villous; leaves denticulate.

Leaves distinctly cordate at base; fruit subglobose. . *A. tibourbou.*

Leaves obscurely or not cordate; fruit depressed. . *A. Schomburgkii.*

Fruit sharply echinate; branchlets as petioles glabrous or puberulent; leaves entire. . . . . *A. membranacea.*

Apeiba membranacea Spruce ex Schumann in Mart. Fl. Bras. 12, pt. 3: 145. 1886.

Slender apparently glabrous tree but the leaves especially on the nerves very minutely and evanescently puberulent and sometimes glabrous, sometimes with tufts of trichomes in the axils of the lateral nerves; leaves oblong-elliptic or elliptic, rounded or obscurely cordulate at base, tip acuminate rarely minutely serrulate, the nerves 6–9; flowers about 1.5 cm. wide; fruits depressed-globose, about 6 cm. across, densely echinate with narrowly conic-based short spines.—As here interpreted there is considerable variation in the degree of development of the trichome tufts in the nerve axils of the leaves beneath. Most of the Peruvian collections except as noted were referred to *A. aspera* Aublet, Brazil to Guianas, included by Uittien in *A. glabra* Aublet with bristly fruits and 4–5-nerved leaves and *A. echinata* Gaertn., same range, with nearly the fruits of *A. membranacea* but the leaves grayish-tomentulose beneath. However, the Peruvian tree seems to be the same as *A. intermedia* Uittien of Surinam but the fruit of that species is unknown. Attains 25 meters, the trunk 3 dm. in diameter (Tessmann); flowers golden or ochre yellow. F.M. Neg. 23809.

Huánuco: Chicoplaya, *Ruiz & Pavón.*—Loreto: Yurimaguas, *Poeppig 2144; Williams 4012; Killip & Smith 29075.* Río Mazán,

José Schunke 95. Río Itaya, *Williams 3315.* Florida, *Klug 2343* (det. Standley). Mouth of Río Santiago, *Tessmann 4622* (det. Burret).—Río Acre: *Ule 9585; 9598.* Mouth of Río Macuahán, *Krukoff 5304.* Colombia; Amazonian Brazil. "Maqui-supa" (Williams); "maqui-zapanaccha" (Schunke).

Apeiba Schomburgkii Szyszyl. Diss. Math. Nat. Acad. Litt. Cracov. 27: 140. 1894. *A. tibourbou* Aubl. var. *membranacea* Lockh. ex Griseb. Fl. Brit. W. Ind. 708. 1864, fide Uittien.

Branchlets and petioles villous with long trichomes; stipules more or less promptly deciduous; leaves rounded or obscurely cordate at base, membranaceous, smooth above but early minutely stellulate especially on the nerves and with a few deciduous long simple trichomes, lightly stellate-tomentose beneath, 7–9- (12) nerved; flowers white; fruit depressed, nearly disk-shaped, opening with 3–7 rather large woody teeth.—After Uittien; in the Peruvian specimen that seems to belong here the leaves are 9–12-nerved and the fruit bristles are hispid with appressed trichomes. F.M. Neg. 9251.

Loreto: Puerto Arturo, *Williams 5004* (det. Standley, *A. tibourbou*). To Colombia and the Guianas. "Maqui-sapa-ñaccha" (Williams).

Apeiba tibourbou Aublet, Pl. Guian. 1: 538, *pl. 213.* 1775. *A. hirsuta* Lam. Encycl. 1: 208. 1783. *A. tibourbou* Aublet var. *rugosa* Szyszyl. Diss. Math. Nat. Acad. Litt. Cracov. 27: 140. 1894. *A. albiflora* Ducke, Archiv. Jard. Bot. Rio Jan. 3: 209, *pl. 20.* 1922, fide Ducke.

Branches, petioles, these 1–3 cm. long and prominent ovate-lanceolate rather tardily deciduous stipules hirsute with spreading trichomes; leaves firm-chartaceous, typically densely stellate-tomentose beneath, more or less rugose and sparsely stellulate above, distinctly cordate at base, 9–15-nerved; flowers yellowish or white, about 2.5 cm. wide, the petals 1–1.5 cm. long; fruit nearly globose, slightly depressed, opening with minute woody teeth, the flexible bristles abundantly spreading hirsute.—After Uittien. The Peruvian specimens vary in having scarcely to very rugose leaves often lightly tomentose beneath; Tessmann recorded one tree 30 meters tall the trunk 1 dm. in diameter but Williams noted the tree as attaining 12 meters with often inclined small buttressed trunks about 3 dm. in diameter, the wood spongy. Determinations mostly

by Standley. Illustrated, Mart. Fl. Bras. 13, pt. 3: *pl. 29* (except fruit). F.M. Neg. 9249.

San Martín: Chazuta, *Klug 4034*. Juanjuí, *Klug 4213*. Tarapoto, *Williams 5694; 6727*.—Junín: La Merced, *5569*.—Loreto: Mishuyacu, *Klug 1087*. Yarina Cocha, *Tessmann 3403* (det. Burret). Yurimaguas, *Poeppig 2097*.—Río Acre: Mouth of Río Macauhán, *Krukoff 5291*. To Central America, the Guianas and the West Indies. "Maqui-sapa-ñaccha," "maqui-sapa" (Williams); "tibourbou."

5. MOLLIA Mart.

Reference: Baehni, Candollea 5: 403–425. 1934.

Usually pubescent often slender branched trees with entire or only apically serrate leaves and rather showy white flowers solitary or fasciculate in the axils, sometimes pedunculate. Sepals free, 5 as the petals. Stamens indefinite shortly coalescent in clusters of 10, the 5 outer longer alternate to the petals; anthers narrowly sagittate. Ovary 2-celled, the cells many-ovuled; style filiform. Capsules 2-celled, ligneous, shortly alate apically, the cells semi-2-valved, spuriously septate between the many compressed emarginate seeds.—Leaves perhaps always barbate beneath in the nerve-axils. My indebtedness to the distinguished Director of the Conservatory of Botany, Geneva, Switzerland, for his stimulating association and thought-provoking work over many years may here be given this merited recognition. Besides, the following mention may be made of *Williams 963* from Nanay especially to note the native name "Uchu-huayo"; it has ovoid fruits barely pointed apically.

Leaves densely lepidote only beneath, serrulate.....*M. gracilis.*
Leaves equally lepidote both sides, entire.....*M. Williamsii.*

Mollia gracilis Spruce, Journ. Linn. Soc. Bot. 5: Suppl. 2: 59. 1861; 413, 424.

Slender branchlets, petioles, these 5–6 mm. long, and leaves both sides lightly and minutely lepidote, the sessile or shortly pedunculate 1–few-flowered inflorescences cinereous lepidote; leaves chartaceous, obscurely serrulate toward obtusish tips, rounded at base, barbate in the nerve axils beneath, elliptic or oblong-elliptic, to 10 cm. long, 6 cm. wide, often smaller; pedicels slender, 2–3 cm.

long; calyces typically about 2 cm. long; fruits unknown.—8-meter tree (Tessmann). Weibel, Candollea 10: 169, 172. 1945, described the placentation, showing the ovary to be 1-celled in bud. F.M. Neg. 32618.

San Martín: Tarapoto, *Spruce 4949*.—Loreto: Santiago, *Tessmann 4198*. Adjacent Colombia and Brazil.

Mollia Williamsii Baehni, Candollea 7: 136. 1936.

Younger branchlets sparsely, petioles, these 12–13 mm. long, peduncles and leaves beneath except the nerves densely lepidote pubescent; leaves entire, ovate, rounded or subacute at base, long-acuminate, 11.5–13.5 cm. long, 4.5–nearly 5 cm. wide, coriaceous, lightly squamose above, not barbate in the axils of the 3 nerves beneath; inflorescences shortly peduncled, 2–4-flowered, fruiting pedicels 2–2.5 cm. long; capsules opaque, scabrellous, sparsely lepidote basally, densely apically, distinctly mucronate, ovoid, complanate, narrowly alate, depressed laterally at septum, 11–13 mm. long, 15–17 mm. wide, 11–12 mm. thick.—Fruits recall those of *M. lucens* Baehni of the Río Negro but those are lustrous and scarcely bilobed, and the short peduncles and larger long-acuminate leaves mark *M. Williamsii* easily. Type from a straight cylindric-trunked tree about 7 meters tall.

Loreto: Río Nanay, *Williams 1160*, type. "Uchu-mullaca."

6. LUEHEA Willd.

Reference: Burret, Notizbl. Bot. Gart. Berlin 9: 822-837. 1926.

Trees or tall shrubs, the usually dentate leaves stellate-tomentose beneath, the showy white or rose-colored flowers disposed in multi-bracteolate axillary cymes or terminal panicles. Sepals and petals 5, the latter glandular-thickened within at base. Stamens many obscurely or very shortly coalescent (in one species completely connate) in phalanges of 5 or 10, the filiform exterior without anthers, basally lanate or pubescent; anthers of the inner sagittate. Ovary 5-celled, many-ovuled; style simple. Capsules subligneous, semi-5-valved, the numerous seeds wing-margined above.—The bractlets may be somewhat coalescent but are never permanently united; the anthers are parallel-connate to apex, and dehisce at the same time by long chinks (Burret). The nerve-axils beneath are usually if not always without the tufts of trichomes found in *Mollia*.

Leaves oblong-elliptic or elliptic but mostly rather more than twice as long as wide; sepals 1–2 cm. long; capsules at most 3 cm. long, obovoid.

Petals oblanceolate; leaves acuminate; capsules nearly shaggy pubescent below ..... *L. Tessmannii.*

Petals obovate; leaves shortly acute; capsules rather appressed pubescent ..... *L. paniculata.*

Leaves broadly elliptic, mostly less than twice as long as wide; sepals about 3 cm. long; capsules 3 cm. long or longer.

Capsules cylindrical, 3.5 cm. long or longer; staminodia filaments shorter than tube ..... *L. grandiflora.*

Capsules sphaeroid, 3 cm. long; staminodia filaments longer than tube ..... *L. tarapotina.*

Luehea grandiflora Mart. Nov. Gen. & Sp. 1: 99, *pl. 61.* 1826; 832. *L. densiflora* St. Hil. and *L. laxiflora* St. Hil. Fl. Bras. Merid. 1: 293–294. 1827, fide Burret, ex char.

Branches and branchlets slender, glabrous; petioles stout, 5–10 mm. long; leaves elliptic, very shortly acuminate or apiculate, slightly oblique at the rounded-subcordate base, commonly less than twice as long as wide, denticulate, usually closely, glabrous or nearly above, stellulate and more or less arachnoid tomentulose beneath, the nerves and veins finally glabrate; flowers usually several in dense or open inflorescences, the early conspicuous separating narrow bractlets about as long as the sepals, these at least about 3 cm. long, the oblong or elongate-obovate petals gradually attenuate to the narrower or scarcely narrower claw; free part of the staminodia short, fringe-like; capsules to 2.5 cm. long or longer, less than half as thick, densely ferrugineous with stellate-tomentum. —After Burret in part, who points out that there are floral differences between this species and the more northern *L. speciosa* Willd. with which it has been confused; apparently his conclusions are sound but the characters relied upon may prove to be variable. The Peruvian material seen is meager but seemingly it belongs here. Illustrated, Mart. Fl. Bras. 12, pt. 3: *pl. 31* (as *L. speciosa*, fide Burret). F.M. Negs. 35411; 35413 (*L. densiflora, L. laxiflora*).

Loreto: Cachipuerto, *Klug 3131* (det. Standley, *L. tarapotina*). Yurimaguas, *Poeppig 2191, Addenda 62* (det. *L. speciosa* in herb.). To southeastern Brazil.

Luehea paniculata Mart. Nov. Gen. & Sp. 1: 100, *pl. 62.* 1826; 834. *L. parvifolia* Huber, Bol. Mus. Paraense 2: 507. 1898, fide Ducke.

Beautiful tree, the slender branchlets, petioles (5–7 mm. long), leaves beneath and many-flowered terminal panicles more or less ferrugineous tomentulose; stipules promptly caducous, 4–5 mm. long; leaves broadly oval or elliptic, truncate or subcordate at base, shortly acuminate, 7–12 cm. long, 4.5–7 cm. wide, more or less inequilateral, coriaceous, glabrous above at maturity, unequally dentate; bracts 4–5 mm. long; peduncles and pedicels 5–10 mm. long; involucrate bracts 9, linear, acute, 8–9 mm. long; sepals lanceolate, 11–12 mm. long; petals irregularly crenulate, about 16 mm. long, 13 mm. wide, white changing to rose, puberulent within above the entire basal gland; stamens in 3–4 clusters, 4–7 mm. long; ovary orange-tomentose; capsule about 2 cm. long, 12–14 mm. thick medially, reddish tomentose, the seed wings rounded apically.—Most of the Peruvian collections fide Burret and not seen by me at least during the final preparation of this compilation. F.M. Neg. 19678.

San Martín: Tarapoto, (*Spruce 4880*). Morales near Tarapoto, *Williams 5699.*—Huánuco: Chinchao, *Ruiz & Pavón; Raimondi* (det. Burret); *Rivero.* Grass steppe, Prov. Huamalíes, 1,000 meters (*Weberbauer 3492*).—Junín: Perené, 700 meters (*Weberbauer 329*). —Cuzco: Sta. Anna, Prov. Convención (*Weberbauer 5021; 5047*). To southeastern Brazil. "Inchato" (*Weberbauer*); "calzoncillo-panga" (Williams).

Luehea tarapotina Macbr. Candollea 5: 382. 1934.

Younger branchlets early reddish furfuraceous with short stellulate indument; petioles 6–7 (12) mm. long; leaves broadly and subobliquely elliptic, lightly cordate at base, subabruptly and broadly acuminate, to 14 cm. long, 8 cm. wide, irregularly dentate, chartaceous, green, slightly lustrous and very sparsely stellate puberulent above, rusty-cinereous tomentulose beneath the nerves and veins reticulate; fruiting pedicels about 2 cm. long, furfuraceous-puberulent; capsules pentagonous-sphaeroid, obscurely angled, about 3 cm. long, 2 cm. thick, densely and persistently rusty pubescent; seeds lustrous, 7 mm. long.—The permanently pubescent fruits and smaller seeds seem to distinguish this from *L. speciosa* Willd. The Klug specimen seen shows imperfect flowers; apparently however the sepals attain 3 cm., the petals are obovate, rather

abruptly broad-clawed, and the filamentous portion of the staminodial phalanges is slightly longer than the united part or tube; the significance of this character may be open to question. However, the capsules are distinctive among the Peruvian species; but as noted by Burret in his careful revision the fruits of several species (Bolivian) are unknown.

San Martín: Juanjuí, *Klug 4347* (det. Standley). Morales near Tarapoto, *Williams 5704*, type. "Calzoncillo."

Luehea Tessmannii Burret, Notizbl. Bot. Gart. Berlin 9: 836. 1926.

Younger branches terete, dark red, glabrous, longitudinally rugulose in drying, the divaricate branchlets above as the petioles (4–8 mm. long) and inflorescences (5–8 cm. long) yellowish-stellulate; leaves elliptic or slightly elliptic-obovate, rather abruptly and shortly but conspicuously acuminate, obliquely rounded at base, evidently denticulate toward the tip, often 5.5–9.5 cm. long, 2.5–4.5 (6) cm. wide, subcoriaceous, soon glabrous above, very minutely and closely puberulent with a cinereous or in herb. ochraceous indument, clearly stellulate only if at all on the more prominent nerves and the conspicuous clathrate-reticulate veins; bractlets deciduous before anthesis, much shorter than the oblong sepals, these yellowish strigose-pilose without, 12 mm. long; petals narrowly oblanceolate, 14 mm. long, basally pilose; ovary yellowish-villous; capsules 1.5–2 cm. long, densely villous especially toward the narrowed base, somewhat obovoid.—Fruit unknown in type. Species nearly *L. cymulosa* Spruce of the Upper Amazon with oblong-lanceolate gradually acuminate leaves, less dense indument on the lower surface (Burret). These distinctions appear varietal but more material is needed of the Spruce species from the region of the type. Type 8 meters, trunk diameter 2 dm.; attains 15 meters (Schunke). F.M. Neg. 9247.

Loreto: Flood free wood, Río Itaya, *Tessmann 3664*, type. Soledad, *Tessmann 5180*. Near Iquitos, *Klug 1472; Tessmann 5122*. Río Mazán, *José Schunke 132*. Caballo-Cocha, *Williams 2419*. "Museg-gui-ey" (Klug, Huitoto); "boleyna" (Schunke).

7. LUEHEOPSIS Burret

Reference: Burret, Notizbl. Bot. Gart. Berlin 9: 838–843. 1926.

As the name implies there are no obvious vegetative characters to distinguish these trees from *Luehea*, but the bractlets are com-

pletely connate, and not separating in age; the petal bases are less thickened, the stamens are always united below into a tube and especially the anthers are free above the middle, somewhat divergent and before anthesis with triangular subcochleariform apical opening, this chink finally extending to base.—The flowers in some species are precocious (Uittien). These observations have added to an understanding of the species-relationships but from a standpoint of floristic, which is to say practical, taxonomy they ought to indicate a subgroup within *Luehea* from which except in flower they are not distinguishable. As the thoughtful author has detailed in his remarks the characters of bractlets and stamen-connation are found in varying degree within the more narrowly defined *Luehea*.

Lueheopsis Juliani Macbr., sp. nov.

Arbor, 10 m. alta; foliis ut videtur non evolutis jam florens; ramulis junioribus petiolisque (11 mm. longis) striatis et minute stellulato-puberulentis; vetustioribus glabris; foliis late ellipticis vel elliptico-obovatis basi valde inaequaliter rotundatis apice breviter abrupteque acuminatis 11–16 cm. longis, circa 7 cm. latis prope apicem grosse repando-dentatis coriaceo-chartaceis, supra glabris nitidis subtus aequaliter et brevissime adpresseque cinereo-pubescentibus, nervis principalibus 3 et venis transversalibus subtus prominentibus subclathratis vix vel obscure reticulatis; ramulis inflorescentiorum plerumque 1–3 cm. longis ut floribus stellulato-pulverulentis; pedunculis circa 5 mm. longis; cupula 5 mm. alta, dentibus ovato-acutis 1–2 mm. longis vel demum profundius fissis; sepalis 14 mm. longis intus sericeo-strigosis; petalis vix 14 mm. longis extus ad basin distincte adpresseque pilosiusculis; antheris 1.5 mm. longis.—Evidently near to and possibly a variant of *L. Hoehnei* Burret, l.c. 841, of Mato Grosso, Brazil, to which species Standley referred it, but the much larger leaves strongly oblique at base and the pubescent petals suggest that it is specifically established. The type consists only of a leafy branchlet and a separate leafless inflorescence; it is probable that the honest collector Klug got them from the same tree and while the size of the leaves may be due to their being on a shoot their form is different from those of Burret's tree and the petals of the latter are described as glabrous without, the flowers too, apparently accompanied by leaves.

In naming this tree for the energetic and enthusiastic Curator of the Department of Botany, Chicago Natural History Museum, Julian Steyermark, I am sincerely pleased because my sense of

indebtedness for his cooperation in selection of materials for the preparation of this work is great.

Loreto: Mishuyacu near Iquitos, *Klug 2528*, type.

8. NEOTESSMANNIA Burret

Tree with stellate and some simple indument, simple alternate leaves, regular hermaphroditic 4–5-merous flowers with valvate distinct sepals, many free stamens, all equal, and with 2-celled introrse linear anthers dehiscing by a short longitudinal nearly apical chink, the pollen grains smooth, in tetrads pyramidally connate. Ovary inferior, in lower part multicelled, in upper part 1-celled with long prominent lateral membranes between which, above and below, are affixed densely the small anatropous ovules. Style simple with clavate tip, the stigma decurrent.—Without fruit position uncertain but seems to require a separate section (Neotessmannioideae Burret) characterized by the unique (for the family) inferior ovary, multicelled below, numerous ovules between partial or complete walls, and pollen grains cohering in tetrads (Burret); the author suggests the available data recall the genera *Apeiba* and *Muntingia*.

The name meritoriously commemorates the famous ethnographer Günther Tessmann, who made exceptionally documented botanical collections in Amazonian Peru and in Africa.

Neotessmannia uniflora Burret, Notizbl. Bot. Gart. Berlin 9: 125. 1924.

Reddish virgate branchlets at tip, leaves, especially beneath on the nerves and petioles (12–18 mm. long) and finally supra-axillary 1-flowered peduncles more or less densely tomentulose with yellowish slender stellate trichomes, some glanduliferous; stipules caducous, the scars oblique; leaves very obliquely cordate at base, obtuse at apex, broadly oblong, to 28 cm. long, 11 cm. wide, obscurely repand-denticulate with 5–6 basal nerves and but 6 lateral, reticulate venation prominent and dense beneath; sepals oblong, obtuse, tomentose on both sides, to 18 mm. long; petals yellow, obovate-oblong, 3–3.5 cm. long, membranous, lightly tomentose near base; filaments subulate, 4 mm. long, little shorter than basally cordate anthers; style 4 mm. thick at base; ovary semiglobose, tomentose, with about 25 thin more or less complete divisions.—F.M. Neg. 9248.

Loreto: Flooded banks of Río Aguaytia, *Tessmann 3160*, type.

9. VALLEA Mutis

Reference: F. Ballard, Bot. Mag. 157: *pl. 9365.* July 2, 1934.

Slender branched shrubs or trees, at least some branches with conspicuous reniform stipules, especially on sterile shoots, and usually ovate, frequently cordate leaves. Flowers on axillary or terminal peduncles, the 5 (rarely 4) sepals valvate, the 3-lobed petals imbricate. Stamens indefinite, in 2 series, the disk biannulate, the linear erect anthers apically dehiscing by 2 oblique pores. Ovary 3–5-celled, the cells medially 2-ovuled; style subulate, the 3–5 filiform stigmas uneven. Fruits finally subligneous, bluntly and carnosely tubercled, tardily dehiscing, imperfectly 3–5-valved.—Commemorates Felix Valle, author of "Florula Corsicae" (1762).

Vallea stipularis L.f. Suppl. 266. 1781. *V. cordifolia* R. & P. Syst. Veg. 132. 1798. *V. pyrifolia* Turcz. Bull. Soc. Nat. Mosc. 31, pt. 1: 237. 1858. *V. pubescens* HBK., Nov. Gen. & Sp. 5: 350. 1823. *V. glabra* Miers, Contr. Bot. 2: 184. 1860–1869.

Attractive small tree, several to 6 meters or so tall, bearing abundant leaves, bright green above, glaucous beneath, pretty roseate to dark or bright red flowers gracefully borne in loose cymes near or at the tips of the many brown-purple branchlets, and early dark green somewhat berry-like fruits covered with soft processes, often all on the same branches at the same time; indument, if present, an unevenly deciduous tomentum of brownish trichomes mostly on the peduncles and pedicels and leaves beneath or now and then persisting in tufts in the nerve axils; stipules obsolete to conspicuous, especially on young sterile shoots, reniform; leaves ovate-lanceolate to broadly ovate, more or less acuminate or acute, rarely reniform or rounded, cordate to subtruncate, usually 6–7 cm. long, 3–4 cm. wide, but highly variable, the veins prominent; petals 3-lobed, usually medially, 9–11 mm. long; stamens densely white pubescent, the somewhat glandular filaments curved and filiform below the greenish or yellowish anthers, both subequal; fruits subglobose, about 1 cm. across, often dehiscing on the tree.—Bark of old trunks fissured; leaves yellowish or reddish in the dry season, those of young shoots sometimes crenate-lobulate. Var. *pyrifolia* (Turcz.) Ballard, l.c., was proposed for glabrous specimens (except nerve-axil pubescence); more striking at least is the variant designated *parvifolia* by me, Candollea 5: 381. 1934, the leaves rotund-reniform, rounded at apex, mostly 3–4 cm. wide, only 2.5–3.5 cm. long; however, as Diels has remarked, the conclusion of Ballard that the

species is highly variable but not divisible, as unstable, is sound. Illustrated, Bot. Mag. *9365;* HBK., Nov. Gen. & Sp. 5: *pl. 489;* Miers, Contr. Bot. 2: *pl. 81* (*V. pubescens*).

Wood reported as valuable by Grisard and Vanden-Berghe, Rev. Sci. Nat. Appl. 39: 587. 1892; West found a tea made from the leaves used medicinally. Common, at least formerly, at middle altitudes, especially from the central valleys, southward.

Piura, Cajamarca, Ancash: *Raimondi.*—San Martín: West of Moyobamba, *Weberbauer 266.*—Huánuco: Near Pampayacu, *Sawada; Kanehira.* Near Huánuco, *2130; Weberbauer 1766.* Pillao, *Woytkowski 34091.* Mito, *1479; 1747.*—Junín: Near Tarma, *Ruiz & Pavón* (type, *V. cordifolia*); *Woytkowski 35465.* Huariaca, *3093; Poeppig.* Huacapistana, *Killip & Smith 24208* (type, var. *parvifolia*); *Weberbauer 1766.* Carpapata, *Soukup 3430* (va. *parvifolia*). —Huancavelica: Salcabamba, *Stork & Horton 10288.*—Ayacucho: Near Ocros, *West 3672* (det. Johnson, *V. cordifolia*). Near Huanta, *Killip & Smith 23314.*—Apurímac: Abancay, *Balls 6896.*—Cuzco: Wenner Gren Ruins, *Metcalf 30764* (det. Killip). Calca, *Vargas 171.* Ollantaytambo, *Herrera 3343; 3440; 3441; Cook & Gilbert 387; 631.* Urubamba, *Soukup 26;* Weberbauer, 182.—Puno: Near Limbani, *Vargas 9638.* Near Puno, *Soukup 444.* Oconeque, *Metcalf 30585.* Tabina, *Lechler 2083.* Sandía, Weberbauer, 237. Without locality (*Mathews 3048,* det. Miers, *V. pubescens*); (*Mathews 892,* det. Miers, *V. cordifolia*). Bolivia; Ecuador and Colombia. "Cugur," "cunhur" (Ruiz & Pavón), "gēllccoy" (Stork & Horton), "chchiclur" or "chchiclurmy" (Herrera), "tchillurnay" (Cook & Gilbert), "chillunmay" (Vargas), "sacha-capuli" (Spruce), "olla-olla," "quellccoy" (both, Raimondi).

10. MUNTINGIA L.

Stellulate pubescent little tree with dentate leaves and white flowers peduncled in the axils and usually 2 or 3 together, sometimes solitary. Sepals free, commonly 5, early 6 or 7 as the broad smooth petals, these approximate with the indefinite stamens about the annulate disk. Ovary glandular-pilose, 5–7-celled, multi-ovulate; stigma sessile, lobulate. Fruit indehiscent, globose, irregularly many-celled, the numerous minute seeds pulp-imbedded.—See Lilloa 3: 31. and plates, Descole and O'Donell.

Bark furnishes a tough fiber suitable for basketry.

Muntingia Calabura L. Sp. Pl. 509. 1753.

Shrub or sometimes a slender tree attaining 12 meters, with many basally very oblique oblong-lanceolate leaves these densely cinereous or brownish stellate beneath, puberulent or soon green and glabrate above, commonly 5–12 cm. long, 2–3 cm. wide; petioles 2–6 mm. long, exceeded by the linear stipules; pedicels 1–3 cm. long; sepals 8–12 mm. long, with nearly filiform acumen about equaling the rarely rose-tinted broadly obovate petals; berry globose, red or yellow, about 1 cm. in diameter, edible.—Branches divaricate, early hirsute, in age glabrous and reddish brown. Illustrated, Mart. Fl. Bras. 12, pt. 3: *pl. 34.*

Piura: Caña Dulce, *Haught 108; 197;* Weberbauer, 150.—San Martín: Tarapoto, *Woytkowski 35162.* Juanjuí, *Klug 3762.* Vitoc, *Ruiz & Pavón.*—Amazonas: Along streams, Weberbauer, 155.—Junín: La Merced, *5232.* Colonia Perené, *Killip & Smith 25067; 25178.*—Loreto: Río Nanay, *Williams 457.* Lower Huallaga, *Williams 4931.* Río Pachitea, *Sandeman 3308.* Iquitos, *Williams 8025; Mexia 6510,* part. Pongo de Manseriche, *Mexia 6169.* Puerto Arturo, *Killip & Smith 27929.*—Cuzco: Valle de Santa Ana, *Herrera 3212; 3283.* Santa Rosa, *Soukup.* Valle de Urubamba, *Herrera 3220.* To southern Mexico and the West Indies. "Bolina," "iumanasa," "mullaca-huayo" (all, Williams), "yumanaza," "ccoillorppanchu" (Herrera), "guinda yumanasa" (Mexia).

11. SLOANEA [Plum.] L.

Reference: C. Earle Smith, Jr., Contr. Gray Herb. 175: 3–114. 1954.

Trunks often buttressed. Leaves alternate or opposite, pinnately veined; stipules sometimes present only in bud. Inflorescences various but usually axillary and racemose or paniculate. Sepals 4–11, ordinarily free. Petals none. Stamens about 50 to more than a hundred, always with connective extended as a knob or an awn. Pistil 3–6-celled, ovules 8–10 in 2 rows per cell, anatropous, pendent, placentation axial. Fruit a loculicidally dehiscent capsule with 3–6 rigid often ligneous valves, smooth or armed with persisting or easily detached (and irritant) spines. Seeds 1–2 (3), medially or nearly completely covered by a firmly attached aril (except one species).—After Smith, who has given a detailed and obviously well-considered and clearly presented monograph, from which the following key and descriptions are compiled. The genus is developed largely to the east and north of Peru but of course

several species besides the following may be found within its northeastern boundary.

Sepals 4–11, unequal, not covering stamens and pistil in bud; flowers in lateral racemes (subgenus *Sloanea* C. E. Smith).

Stipules caducous; flowers often crowded; capsules to 3.5 cm. long (section Brevispicae C. E. Smith).

Leaves clustered apically.

Stamen awn elongate-filiform; capsules to 2 cm. long, spines to 5 mm. thick.....*S. rufa.*

Stamen awn short, thick.

Capsules merely granulose; sepals 4 or 5.....*S. granulosa.*

Capsules spinose; sepals usually 5.....*S. spathulata.*

Leaves distributed evenly.....*S. guianensis.*

Stipules at least somewhat persistent; flowers borne laxly (section Sloanea C. E. Smith).....*S. fragrans.*

Sepals 4 (5), equal, covering stamens and pistil in bud; flowers (Peru) not racemose (subgenus *Quadrisepala* C. E. Smith).

Flowers paniculate; capsule spines to 1 cm. long.....*S. laxiflora.*

Flowers 1–3, subumbellate; capsule spines short (2 mm.). *S. terniflora.*

Sloanea fragrans Rusby, Mem. N. Y. Bot. Gard. 7: 294. 1927; 68.

Stout twigs, rigid coriaceous obovate leaves and long (13–27 cm.) inflorescences minutely puberulent to glabrate; stipules 2.5–13 cm. long, obovate, obtuse, unevenly dentate; petioles terete, 5–20 cm. long, alternate; leaves 4.5–6.5 dm. long or longer, 2–3 dm. wide, acute at base, obtuse, undulate-margined; peduncles 1 dm. long, pedicels to 2.5 cm. long, bracts ovate, 4–10 mm. long, unevenly to few-dentate; flowers 1–1.5 cm. long, sepals 7–9, ovate to lanceolate, obtuse, 4–6 mm. long, puberulent-sericeous on both sides; stamens 4–8 mm. long, anther awn flattened, to 1 mm. long, the awns in bud imbricate, forming a globose mass; style not parted; capsule (young) densely covered with curved spines.—A large tree.

Loreto: Pongo de Manseriche, mouth of the Río Santiago, *Tessmann 4609*. Bolivia to Colombia.

Sloanea granulosa Ducke, Bol. Tech. Inst. Agron. do Norte 19: 13. 1950; 45.

Related to and resembling *S. rufa* but glabrate or shortly pubescent; stipules deltoid-lanceolate, to 2 mm. long; petioles 8–15 mm. long; leaves subacute to rounded at base, obtuse to emarginate at apex, 9–14 cm. long, 4.3–9 cm. wide, sparsely short-pubescent beneath and with scattered long trichomes along the mid-rib; inflorescences 1.5–2 cm. long, 3–7-flowered, the peduncles 1–4 mm. long, pedicels 4–12 mm. long, bracts 1–2 mm. long, rarely few-dentate; flowers 4–9 mm. long, sepals 1.5–2 mm. long, glabrous within; stamens 1.5–2.5 mm. long, the broad anthers with a short stout glabrous awn; style deeply 4-parted; capsules about 3.5 cm. long, ovoid, the 4 valves 4–5 mm. thick, smooth and red inside, granulose and densely fine-pubescent without; seed 17 mm. long, covered to the funiculus with a fimbricate 5-lobed red aril.—The only locality in Peru (if that of Pearce) is on the Río Marañón. Becomes a very tall tree with large radiating buttresses (Ducke).

Peru(?): Monterico (Pearce). Amazonian Brazil.

Sloanea guianensis (Aublet) Benth. Journ. Linn. Soc. 5: suppl. 69. 1861; 33. *Ablania guianensis* Aublet, Pl. Guian. 585. *pl. 234.* 1775.

Stipules 0.5–1 mm. long, lanceolate, obtuse; petioles 1–3 mm. long, opposite or subopposite, not clustered at twig-tip; leaves obovate to elliptic-lanceolate, obtuse to cuneately acute at base, obtuse to acuminately obtuse at apex, 5–22 cm. long, 2.5–9.5 cm. wide, glabrous to minutely pubescent above, sometimes sparsely hirsute and barbate in the prominent nerve axils beneath, entire to obtusely dentate; inflorescences 1–9-flowered, 1.5–3 cm. long, sparsely to densely fuscous pubescent, the peduncles to 1.5 cm. long, pedicels 3–8 mm. long, bracts 5–15 mm. long, these deltoid to obtusely lanceolate; flowers white to yellow, 3–8 mm. across, 5–8 mm. long; sepals 4–9, variable in size, shape and pubescence, sometimes glabrous within; stamens 2–4 mm. long, the awn a fourth to a third as long as the sublanceolate anthers; style 4-parted; capsule 9–12 mm. long, 6–9 mm. in diameter, the usually 4 valves velvety and rather densely spiny antrorsely pubescent spines 5–9 mm. long; seed to 1 cm. long, almost enclosed by a 5-lobed aril.—Said to attain 25 meters and to develop triangular buttresses; valued for firewood and paddles (Mexia). *S. trichosticha* Williams & Sandw., Flora Trinidad & Tobago 1: 110. 1929, has smaller flowers with exserted awnless stamens, hirtellous capsule spines and has been found in adjacent Brazil (Río Acre).

Loreto: Pongo de Manseriche, Río Marañón, *Mexia 6137*. Along the Ucayali, *Tessmann 3213*. Brazil to Trinidad and Venezuela. "Cutana-cuspi" (Mexia).

Sloanea laxiflora Spruce ex Benth. Journ. Linn. Soc. 5: suppl. 65. 1861; 82. *S. acutiflora* Uitt. Recueil Trav. Bot. Neérl. 22: 357. 1925, fide Smith. *S. polyantha* Ducke, Archiv. Inst. Biol. Veg. Río Jan. 2: 162. 1935, fide Smith.

Glabrous except for the finely pubescent branchlets and often terminal inflorescences, these 5–11 cm. long; petioles alternate, to 1.5 cm. long; leaves ovate to elliptic, rounded at base, acuminate-acute to obtuse, 4.5–15 cm. long, 2.5–8 cm. wide, subcoriaceous, veins prominent beneath, margin more or less entire; peduncle 3–5.5 cm. long, pedicels 5–10 mm. long; flowers white or yellowish, 6–10 mm. long, sepals apparently soon falling, puberulent both sides; stamens 3–7 mm. long, anthers dehiscing apically, with a short glabrous awn; style entire; capsules 2.5–3 cm. long, subglobose, the 4 valves 2–2.5 mm. thick, densely spinose; spines subrigid, 8–10 mm. long, puberulent; seed white, to 2.3 cm. long, with a 3 lobed pale yellow aril (fruit character after Ducke).—A buttressed tree observed as high as 15 meters.

Loreto: Iquitos (*Ducke 1833*). To the Guianas.

Sloanea rufa Planchon ex Benth. Journ. Linn. Soc. 5: suppl. 68. 1861; 43. *S. longicaudata* Ducke, Bol. Tech. Inst. Agron. do Norte 19: 14. 1950, fide Smith.

Twigs stout, cinnamon pubescent; stipules subpersistent, ovate, laciniate, 4–12 mm. long, densely pubescent; petioles to 7.5 cm. long, rufous-tomentose; leaves elliptic to obovate, rounded to cordate at base, acutely or obtusely short-acuminate, 11–32.5 cm. long, 5.5–27 cm. wide, coriaceous, densely pubescent medially above, rufous-tomentose beneath, the veins prominent, obscurely but sometimes spinulosely repand-dentate; inflorescence 5–9-flowered, 1.5–3 cm. long, densely pubescent, the peduncles 1–2 cm. long, pedicels 3–10 mm. long, bracts 1–3 mm. long, laciniate; flowers 5–7 mm. long, pale green or yellowish; sepals 2–3 mm. long, within pubescent only toward margin; stamens 2–4 mm. long, the glabrous filiform awn to 1.5 mm. long; style 4-parted; capsules probably to 2.5 cm. long, valves 4(?), to 1.5 mm. thick, with many semirigid sparsely hispid clavate spines about 4 mm. long.—Small tree to 7 meters tall (Klug) resembling *S. spathulata* C. E. Smith and

S. granulosa Ducke in the apically crowded leaves but distinctive in pubescence and stipules. *S. Duckii* C. E. Smith, l.c. 44, is distinguished by glabrous foliage and much smaller capsules (author); found as near Peru as São Paulo de Olivença, it probably extends westward.

Loreto: Mishuyacu near Iquitos, *Klug 53*. To French Guiana.

Sloanea spathulata C. E. Smith, Contr. Gray Herb. 175: 43. 1954.

Twigs sparsely pilose or glabrate, the leaves crowded toward the tips; stipules lanceolate, to 5 mm. long, pilose; petioles stout, 3–9 mm. long, canaliculate above; leaves obovate, abruptly obtuse at base, mucronulately subacute, 12–33.5 cm. long, 4.5–nearly 14 cm. wide, chartaceous, sparsely pilose beneath, the secondary nerves very prominent, undulate or repand-dentate toward apex; inflorescences immature, to 1 cm. long, pubescent, the peduncles 4 mm. long, pedicels 3–4 mm. long, bracts 0.5–1 mm. long, entire, obtuse; flowers 3–4 mm. long; sepals mostly 5; anthers longitudinally dehiscent, shortly apiculate; style 4-parted apically; capsules 2–2.5 cm. long, the usually 4 valves 2.5–3.5 mm. thick, the many sparsely tomentose spines 6–8 mm. long, slightly curved.—Differs from *S. rufa* Planchon in the narrow leaves with very short petioles and in the short anther awn (author); probably occurs in adjacent Peru. Type was a tree 18 meters high.

Río Acre: near mouth of Río Macauhan, *Krukoff 5337*, type; also *5393*.

Sloanea terniflora (Moc. & Sessé) Standl. Trop. Woods 79: 10. 1944; 94. *Lecostemon terniflorum* Moc. & Sessé ex DC. Prodr. 2: 639. 1825. *S. quadrivalvis* Seem. Bot. Voy. Herald 85. *pl. 15*. 1853.

Unique among Peruvian species in the umbellately 1–3-flowered inflorescences, these 3.5–5 cm. long; indument on all parts a puberulence or lacking; petioles alternate to opposite, 3–20 mm. long; leaves subovate, elliptic or obovate, subcordate, rounded or cuneately obtuse at base, rounded to obtuse at apex, 6.5–15 cm. long, 3–7.5 cm. wide, chartaceous to coriaceous, entire to unevenly repand-dentate; peduncles 1.5–3 cm. long, pedicels 8–13 mm. long; flowers maroon, 5–7 mm. long; sepals ovate, puberulent on both sides; stamens 3.5–4 mm. long, anthers apically dehiscent, the puberulent awn 0.5–1 mm. long; style entire; capsule ellipsoid, 1.5–2.5 cm. long, 1–2-seeded, the 4 valves 1–3 mm. thick, densely

covered with easily detached spines, these about 2 mm. long; seed 1–1.2 cm. long, nearly covered with irregularly margined aril.—Buttressed tree (known to 30 meters high).

Loreto: above Iquitos, *Mexia 6510*. To Mexico and Brazil. "Anallocaspi" (Mexia).

MALVACEAE. Mallow Family

Herbs or shrubs, rarely arborescent, the indument usually stellate or lepidote, the stems often fibrous. Leaves alternate, entire or variously lobed, the stipules free, except *Nototriche*. Flowers hermaphrodite, rarely dioeceous or polygamous, often bracteolately involucrate. Sepals (4) 5, more or less connate, valvate or the calyx rarely truncate. Petals 5, distinct but often adnate at base to the staminal column, contorted or imbricate. Stamens many (or 5 or 10), hypogynous, monadelphous, the anthers 1-celled. Ovary free, 2- or more-celled, the fruit usually consisting of 4–many carpels around a central axis or rarely of 1 carpel, or the carpels seriate vertically; style sometimes completely connate, as many or twice as many as the carpels; ovules 1 or more, from the inner angle of each cell.—The fruit is usually dry, separating into cocci, these indehiscent, or bivalved, or the fruit rarely capsular.

Here belongs of course cotton, at least one species native to Peru. And the family is scarcely less known for two beautiful plants widely grown for ornament, hibiscus (*H. rosa-sinensis* L.) in the tropics and subtropics, and mallows or hollyhocks (*Althaea rosea* Cav.) in temperate regions. The alpine mallows of Peru, the Nototriches, are among the most beautiful of high Andean flowers; the plants often form little gray-green cushions in loose soils and rocks, usually below melting snow, and in flower many varieties are colorful with their small mallow-type blossoms in delicate or bright blues and violets, scarlet or crimson, sometimes white.

The wording of this compilation of the Peruvian mallows is mine since the well-known student of the group, B.P.G. Hochreutiner, was unable to contribute it as long planned. However, he has been kind enough to read it for errors and omissions, reminiscent of his co-operation and encouragement during my Geneva sojourn. Most of his many useful suggestions have been noted in the text by his name or his initials. The technical key is naturally in part traditional but also in part after Thomas H. Kearney, Am. Midl. Nat. 46: 98–105. 1951, and I acknowledge my indebtedness and ap-

preciation also for his useful "The American Genera of Malvaceae," l.c., which contains references and critical notes detailing the basic characteristics of most American genera, especially those whose relationships are still incompletely understood; it has been my endeavor to pass on accurately Kearney's observations and those drawn by him from other students, notably from Hochreutiner's great contributions to an understanding of the fruiting characters of the family in Ann. Cons. Jard. Bot. Genève 21: 347–387. 1920, which is summarized lucidly; cf. Hochreutiner, Flora Madagascar.

Besides the technical key, one devised largely on characters other than those of fruits for the determination of perhaps most at least of the Peruvian species has been appended. The present taxonomy of the group does not permit this to be entirely definitive; probably someone will simplify this in due time, letting sectional names serve for present generic ones maintained on relatively developed characters of carpels and carpel-dehiscence. Of course, as in better organized families, concomitance of characters should be stressed, not differences largely, but similarities.

Omitted from the key is *Lavatera assurgentiflora* Kellogg, of the Santa Barbara Islands; it was found cultivated at Huancayo by Luis A. Chavez; in Puno by J. Soukup; it resembles *Hibiscus*, but has a broadly 2–3-lobed involucel. *L. arborea* L., with villous inflorescences, was purchased in the markets of Lima (*Cook & Gilbert 2076*), as "Malva real or común" and, while similar to the former, has deltoid-ovate bractlets longer than calyx lobes, erect instead of recurved-assurgent pedicels, and violet instead of roseate flowers.

No single "Flora" has contributed more to the preparation of this one than the scholarly example, Flora of Jamaica, by Fawcett and Rendle and it is fitting for me to give it credit here particularly since so many Malvaceae occurring in Peru are also found in Jamaica.

KEY (PERUVIAN SPECIES)

Carpels in 2 or more superposed verticels (unless one species), at maturity completely separate, indehiscent; herbs with solitary flowers, no involucel ..... 1. *Palaua.*

Carpels commonly as many or half as many as the style branches, uniseriate; genera never completely as above.

Style branches normally 10, twice as many as the indehiscent (or tardily) carpels; stigmas capitate or discoid.

Petals auriculate on one side below; fruit, until dry, berry-like with fleshy envelope.....2. *Malvaviscus.*

Petals unappendaged; fruit not berry-like, even early, dry.

Inflorescence foliaceous-bracted.....3. *Malachra.*

Inflorescence not foliaceous-involucrate.

Leaf midnerve beneath with gland near base; carpels glochidiate.....4. *Urena.*

Leaf nerves glandless; carpels sometimes aristate or muricate.....5. *Pavonia.*

Style branches and carpels same number or style unbranched.

Carpels never free, the fruit capsular; stamen tube rarely filamentous at apex.

Style branches somewhat divergent, stigmas more or less capitate or discoid; seeds usually reniform.

Calyx regularly 5-dentate or -lobed, persisting. 6. *Hibiscus.*

Calyx spathaceous, unevenly 2–3-lobed, deciduous. 7. *Abelmoschus.*

Style branches short, erect or style unbranched, clavate; seeds usually angulate or obovoid; calyx with black glands.

Bractlets small, more than 3, or wanting; calyx 5-cleft. 8. *Cienfuegosia.*

Bractlets 3, foliaceous or caducous; calyx dentate or subentire.....9. *Gossypium.*

Carpels finally free, the fruit a schizocarp unless *Abutilon;* stamen tube filamentous at and often below apex.

Stigmas decurrent on the slender pointed style branches. 10. *Malva.*

Stigmas apical or nearly, distinctly larger than styles (except a few Chilean species of *Abutilon*).

Ovules normally 2 or more in each carpel.

Involucel wanting.

Carpels more or less completely divided (by a fold of the lateral walls) into 2 superposed cavities. 11. *Wissadula.*

Carpels 2-celled by a horizontal projection (endoglossum) of the dorsal wall....12. *Pseudabutilon.*

Carpels 1-celled, the cavity undivided. . . 13. *Abutilon.*

Involucel present; herbs. . . . . 14. *Modiola.*

Ovule normally solitary (except *Sphaeralcea*, and solitary in the Peruvian species).

Involucel present (sometimes obsolete or caducous in *Malvastrum*, *Sphaeralcea*); ovule erect or ascending.

Carpel cavity more or less divided by transverse septum, a horizontal projection of the dorsal wall. . . . . 14. *Modiola.*

Carpel cavity not divided or only slightly (one genus, sens. lat.).

Carpels clearly diverse apically and basally, reticulate, lower part indehiscent. . . . 15. *Sphaeralcea.*

Carpels not clearly diversely segmented, usually not reticulate. . . . . 16. *Malvastrum.*

Involucel none; (rarely present in Nototriche annuals) also see *Malvastrum*, *Sphaeralcea.*

Carpels much inflated.

Carpel cavity entirely open. . . . . 13. *Abutilon.*

Carpel cavity with an organ maintaining the seed inside the dehiscent carpel. . . . . 18. *Gaya.*

Carpels little or not at all inflated.

Carpel bases separated from carpel body, uniting into a cup, apices often alate. . . . . 19. *Cristaria.*

Carpel bases not cupulate nor apices alate, unless in *Sida* (rarely).

Carpels typically with diverse indehiscent basal section. . . . . 15. *Sphaeralcea.*

Carpel cavity partly to completely divided (by fold of lateral walls) but dehiscence equal. 11. *Wissadula.*

Carpel cavity entirely open.

Stipules (rarely none) and petioles united; ovule erect-ascending; stems, except few annuals, polsterform. . . . . 17. *Nototriche.*

Stipules free; ovule pendulous or horizontal.

Carpels loculicidal nearly to base; calyx lobes 4. . . . . 23. *Tetrasida.*

Carpels septicidal, often septicidal and loculicidal, separating; calyx lobes 5.

Lateral carpel walls firm.....20. *Sida.*

Lateral carpel walls fragile.....21. *Anoda.*

Carpels loculicidal, persisting; calyx lobes 5. 22. *Bastardia.*

VEGETATIVE KEY (ONLY FOR PERUVIAN SPECIES)

Flowers subtended by large foliose bracts.

Bracts laciniate, exceeded by the showy flowers....9. *Gossypium.*

Bracts entire, conspicuous, concealing the small flowers. 3. *Malachra.*

Flowers often with an involucel of more or less developed bractlets but not notably foliose-bracted.

Involucel of 3–many distinct or connate bractlets present at calyx base (sometimes deciduous, rarely caducous as in *Malvastrum;* see also annual *Nototriche*).

Flowers showy, several cm. long.

Corolla funnelform, petals with 1 auricle on claw; fruit berry-like.....2. *Malvaviscus.*

Corolla more spreading (unless rarely in *Hibiscus*); petals not auricled nor fruit berry-like.

Calyx deeply 5-lobed, gland-dotted.....8. *Cienfuegosia.*

Calyx shortly 5-dentate or -lobed or 2–3-lobed.

Calyx persisting, the teeth or lobes regular...6. *Hibiscus.*

Calyx deciduous, 2–3-lobed, spathe-like..7. *Abelmoschus.*

Flowers small, at most a cm. or two long, rarely somewhat longer (see one or two species of *Hibiscus.*)

Leaves with 1 or more glands on nerves beneath; bractlets connate.....4. *Urena.*

Leaves without nerve-glands; bractlets distinct.

Herbaceous annuals or biennials.

Style branches slender, introrsely stigmatic; plants often low, spreading.....10. *Malva.*

Style branches with apical or subapical stigmas.

Flowers solitary; carpels transversely subseptate. 14. *Modiola.*

Flowers not solitary, often racemose; carpels with 2 sections or slightly if at all septate.

Carpels (typically) with 2 diverse parts. 15. *Sphaeralcea.*

Carpels not clearly diversified.....16. *Malvastrum.*

Suffrutescent or shrubby, sometimes acaulescent.

Style branches twice as many as carpels; leaves green or greenish, longer than wide or flowers few, pedicellate; inflorescences short, few-flowered or paniculate. 5. *Pavonia.*

Style branches and carpels same number; flowers racemose or somewhat congested; leaves about as wide as long (*Hibiscus brasiliensis* might be sought here). 16. *Malvastrum.*

Involucel none (specimens with only mature calyces of group with involucel only into anthesis [as *Malvastrum* sp.] might be sought here).

Flowers solitary, adnate as stipules to petioles; depressed alpine perennials, rarely annuals.....17. *Nototriche.*

Flowers, stipules and petioles not jointly adnate.

Styles as many as carpels, the latter in 2 or more superposed verticels except one species; flowers axillary, solitary. 1. *Palaua.*

Styles or branches as many as the uniseriate carpels.

Leaves entire or essentially, except *Anoda,* sometimes obscurely or minutely crenulate, rarely serrate and hastately lobed, never linear.

Flowers solitary on axillary peduncles; leaves often hastately lobed.....21. *Anoda.*

Flowers not solitary nor leaves lobed.

Calyx 4-lobed; carpels basally loculicidal; leaves soon glabrous above.....23. *Tetrasida.*

Calyx 5-lobed; leaves glabrate or pubescent on both sides.

Petals white, medially adnate to stamen tube; leaves green; tree.....20. *Sida.*

Petals usually yellow, only basally adnate; leaves canescent beneath; herbs or shrubs. 11. *Wissadula.* 13. *Abutilon.*

Leaves more or less distinctly serrate, rarely entire and linear, sometimes palmately lobed or parted, not hastately leaved annuals.

Leaves more or less palmately lobed or parted.

Carpel bases dilated, forming a cup; flowers long-pedicellate.....19. *Cristaria.*

Carpel bases cupulate, not dilated; flowers sessile or pedicellate.....20. *Sida.*

Leaves serrate or rarely entire, then linear.

Carpels much inflated; leaves usually canescent at least beneath.

Carpels 1-celled.....13. *Abutilon.*

Carpels partly divided.....18. *Gaya.*

Carpels not or little inflated; leaves often green or fruit capsular (*Bastardia*).

Carpels normally 1-seeded.

Indument glandular; carpels persisting, loculicidally dehiscent.....22. *Bastardia.*

Indument eglandular; carpels separating, septicidally or septicidally and loculicidally dehiscent.....20. *Sida.*

Carpels normally 2-several-seeded.

Flowers rarely 1 cm. long; seeds 2 or 3 in capsule divided by a fold or a dorsal projection or a lateral fold.

12. *Pseudabutilon.* 11. *Wissadula.*

Flowers rarely as short as 1 cm.; seeds usually several, in a single-celled capsule.

13. *Abutilon.*

1. PALAUA Cav.

Reference: Hochreutiner, Ann. Cons. Jard. Bot. Genève 5: 170–173, 1901.

Tomentose or glabrate herbs, rarely suffrutescent, with axillary peduncled solitary ebracteolate flowers and usually sinuately lobulate or dissected leaves. Anthers clustered at apex of filament tube. Ovary cells many, 1-ovuled, the filiform style branches same number, enlarged apically and vertically stigmatose. Carpels at maturity inordinately capitate-congested in 2 or more superposed verticals

(except in *P. Guentheri*), parting from the receptacle, indehiscent, the seed ascending.—Genus name changed to *Palava* and *Palavia* by later authors but honors Antonio Palau y Verdera, early botanist of Madrid. See also Ulbrich, Bot. Jahrb. 42: 104–113. 1908 for a detailed revision.

Perennials, suffrutescent; leaves densely tomentose, obscurely or not lobulate.

Leaves crowded, ovate-cordate, nerves impressed above, rugose beneath.....*P. moschata.*

Leaves soon openly borne, ovate or elliptic, plane....*P. velutina.*

Annuals; leaves, at least cauline, rarely undivided, then lightly pubescent.

Leaves all undivided or the upper more or less obscurely lobulate.

Petals little if at all exceeding the calyx.

Leaves green, the indument sparse.....*P. malvifolia.*

Leaves densely stellulate, especially beneath..*P. inconspicua.*

Petals much longer than the calyx.

Leaves green, lightly stellulate only beneath in age. *P. rhombifolia.*

Leaves cinereous, greenish-gray even above only in age. *P. tomentosa.*

Leaves more or less divided or subbasally trifid and lobulate unless the early basal.

Calyx lobes ovate; leaves dissected or trifid, at least upper.

Upper leaves trifid, the lobes lobulate.....*P. Weberbaueri.*

Upper as lower cauline leaves more or less dissected. *P. dissecta.*

Calyx lobes linear; leaves unequally pinnate or subentire. *P. Guentheri.*

Palaua dissecta Benth. Journ. Linn. Soc. Bot. 6: 101. 1862; 173. *P. flexuosa* Mast. Gard. Chron. 435. 1866. *P. mollendoensis* Ulbr., *P. geranioides* Ulbr., *P. pusilla* Ulbr., Bot. Jahrb. 42: 108, 111, 112. 1908.

Decumbent ascending or early subacaulescent and suberect, lightly (unless calyces) stellulate-hispidulous or subtomentose, the cauline leaves palmately dissected, the lobes themselves more or less and unevenly pinnate, 3–5-lobed or rarely subentire, the crenate basal oblong-ovate, the dissected upper more deltoid-ovate, variable

also in size, ordinarily 2.5–5 cm. long and somewhat narrower; stipules subulate to 7 mm. long; peduncles slightly or early much exceeding the leaves; calyx 7 mm. long, hispid-stellate, the broadly ovate lobes acute to acuminate, 4 mm. long, not glandular-dotted; petals (1) 2 cm. long or longer, mauve to magenta or white below; anthers bright red; carpels obovoid, rugose reticulate.—Partly after Hooker and Masters, the former under Bot. Mag. *pl. 5768*. The type with much-dissected leaves was mixed with *P. rhombifolia* Grah. with entire leaves; the purplish petals only 1 cm. long, in Chile (Johnston). Flowers deep magenta, the centers white (Worth & Morrison). *Pennell 13329*, referred by Ulbrich to his *P. pusilla*, as "typical but only 3 cm. high, unbranched, with few leaves." *P. mollendoensis* is apparently merely a robust (certainly annual) specimen, larger in all parts; Guenther & Buchtien specimen consists of young plants with subentire leaves on the lower parts of the stem (Ulbrich). *P. geranioides* apparently has slightly larger stipules but nothing else to distinguish it. The carpels have been described by Bruns on the basis of *Guenther & Buchtien 229* as nearly 30, brownish, tetragonous, laterally applanate, scarcely convex, gibbous-verrucose, the elliptic seed with some long trichomes in the region of the hilum. F.M. Negs. 9255 (*P. geranioides*); 9256 (*P. mollendoensis*); 9257 (*P. pusilla*).

Lima: San Lorenzo, *Maclean*, type. Without locality, *Cuming*. —Arequipa: Posco, *Vargas 2015; Cook & Gilbert 53* (det. Ulbrich); (*Guenther & Buchtien 212*, det. Ulbrich). Lomas near Mollendo, 600 meters, *Weberbauer 1584* (type, *P. mollendoensis*); *Weberbauer 1467* (type, *P. geranioides*); *Weberbauer 1573* (det. Ulbrich); *Mexia 05165; Worth & Morrison 15755; West 8199* (all det. Johnston). East of Islay (*Worth & Morrison 15711*, det. Johnston). Mejía, 40 meters (*Guenther & Buchtien 229*, det. Ulbrich, *P. geranioides*). Mejía to Chalascapa, (*Guenther & Buchtien 219; 220*, det. Ulbrich, *P. mollendoensis*). Open gravelly places, Pampa de Arrieros, 3,750 meters, *Pennell 13329*. Chile. "Corilla" (Mexia).

Palaua Guentheri Bruns, Mitt. Inst. Allgem. Bot. Hamb. 8: 56, *pl. 8*. 1929. *Malvastrum mollendoense* Ulbr. Bot. Jahrb. 42: 120. 1908. *P. mollendoensis* (Ulbr.) Johnst. Journ. Arnold. Arb. 19: 260. 1938, not Ulbrich, 1908.

More or less ashy stellate-tomentose annual with usually several spreading slender stems, the unequally pinnate leaves and flowers crowded at the nodes and tips; leaves with 1–2 (type) or 3–5 (7)

narrowly linear-lanceolate segments 1–1.5 mm. wide; peduncles 1–3 cm. long; calyx 8 (–12) mm. long, parted nearly to the base, tomentose especially below, the linear lobes strongly 1-nerved; petals blue or pale rose-color, little longer than calyx, obtuse, ciliate toward base; stamen tube 5–7 mm. long; styles 3–6 mm. long, 9–12-lobed, filaments 2–2.5 mm. long; carpels 9–12, convex, subglobose, glabrous.—Undoubtedly a species of *Palaua* (Johnston); not a good *Palaua*, the carpels being uniseriate although somewhat unequal in length (young); its most striking feature is the high and narrow deeply lobed somewhat urceolate calyx, the slender lobes marked by a dark central stripe (Kearney). It is a heresy to have a plant with uniseriate carpels in the genus *Palaua* (B.P.G.H.); and, finally, Krapovickas, Bol. Soc. Argent. Bot. 4: 187. 1952, has studied material that confirms the original diagnosis and the observation of Johnston that the carpels actually are in two incompletely superimposed series (Leafl. West. Bot. 6: 168. 1952). F.M. Negs. 20924; 9319 (*M. mollendoense*).

Arequipa: Prov. Islay, sand dunes, *Mexia 7777* (det. Johnston); *Vargas 8432*. Mejía, lomas, *Guenther & Buchtien 191*, type. Near Mollendo, *Weberbauer 1548* (type, *M. mollendoense*); *Mexia 4180*.

Palaua inconspicua Johnst. Contr. Gray Herb. 85: 151. 1929.

Herbaceous annual; stems erect or more or less decumbent, solitary or many, 1–2 dm. long, slender, simple, rarely shortly few branched, with minute stellate pubescence; leaves scarcely rosulate, upper reduced, all orbicular-reniform-cordate, obtuse, 1–3.5 cm. long and wide, more or less obscurely 3–5-lobate, minutely stellulate above, paler and densely stellate beneath, the 5 palmate nerves prominent; petioles slender, stellate; stipules subulate, persisting, ciliate, 2–5 mm. long; peduncles slender, 1–3 cm. long, 1–5-flowered, the articulate part 1–4 mm. long; calyx campanulate, 2–3 mm. long, stellate, the lobes ovate; petals white, 2–3 mm. long, scarcely longer than the calyx which conceals the depressed globose fruit, this 3–4 mm. broad; carpels 20–25, 1-seeded, 0.9 mm. long, compressed ovoid, glabrous, rugose, the seeds 0.7 mm. long.—Differs from *P. modesta* (Phil.) Reiche in distinctly annual, shorter, less conspicuously spreading trichomes, smaller corollas (Johnston). Not seen (as indicated of course by the parenthesis of the collector's name) but the description of fruit as "depressed" has caused Hochreutiner to query: Is it sure that this is pluriverticillate with superposed verticils?

Arequipa: Lower edge of fertile belt, Mollendo, (*Johnston 3565*, type). Chile.

Palaua malvifolia Cav. Diss. 1: 40. *pl. 11*. 1785; 172. *P. parviflora* (L'Hér.) Hochr. Ann. Cons. Jard. Bot. Genève 5: 173. 1901. *Malope parviflora* L'Hér. Stirp. Nov. 1: 105, *pl. 50*. 1789. *P. declinata* Moench. Meth. 609. 1794. *P. micrantha* Ulbr. Bot. Jahrb. 54: Beibl. 117: 48. 1916, fide Johnston.

Prostrate annual, simple or well-developed plants with many stems, these rather remotely branched, the indument sparse or nearly lacking, minutely stellulate except on the 1.5–2 mm. long narrow stipules; leaves broadly ovate to subrotund, sinuate to obscurely lobulate, variable in size, often 2–3 cm. long; peduncles to 2.5 cm. long, usually shorter; flowers red; calyx 2–3 mm. long, the lobes broadly ovate; petals suborbicular, 3–4 mm. long, the stamen tube about half as long; carpels many, glabrous, rugulose, scarcely 1.5 mm. long, the seeds glabrous.—*P. micrantha* var. *hirsuta* Ulbr. Notizbl. Bot. Gart. Berlin 11: 517. 1932 has white flowers and larger leaves, these sparsely hirsute both sides, the petioles and branches more densely. Ulbrich confused this with *P. rhombifolia* Graham, in spite of the revision of Hochr. l.c. 170–173. As pointed out by Otto Kuntze, Rev. Gen. 3: 157. 1898, Fries and others (cf. *Sida palmata*) the correct date of L'Héritier's work (above page and plate) is 1789. *Dombey* from the Lima sands is the type for both names. My specimens were from the dryer seaward slopes of sandy lomas. Hochreutiner restricted the name of L'Héritier to the type, the leaves subcuneate at base, but has indicated to me he now feels both names apply to the same species. F.M. Negs. 9495; 23760.

Lima: Lomas de Chancay, *Raimondi* (det. Ulbrich). Barranca near Lima, *Weberbauer 1600; 1606; 5692* (type, *P. micrantha*). *Ruiz & Pavón; Dombey*. Lurín, *5939* (det. Johnston).—Arequipa: Atiquipa, *Raimondi* (det. Ulbrich). Near Mejía, Loma formation, 200 meters (*Guenther & Buchtien 198*, type, var.). Chile.

Palaua moschata Cav. Diss. 1: 41, *pl. 11*. 1785. *P. lomageiton* Ulbr. Notizbl. Bot. Gart. Berlin 11: 516. 1932.

Sprawling, often forming patches, the defoliate older lignescent stems and branches densely clothed with stipular and petiolar remains; stipules lanceolate; petioles 1–8 cm. long; leaves many, crowded at the branchlet tips, cordate-ovate, obtuse or rounded at

apex, crenate or crenate-serrate, sometimes obscurely lobulate, 2–5.5 (8) cm. long, nearly or quite as wide, densely tomentose on both sides, more or less bullate above by the impressed veins, rugulose beneath by the prominent nerves and veins; calyx tomentose, about medially lobed, angled, 1–1.5 cm. long, the lobes acute; petals reddish-lilac, obovate, obtuse or truncate, 1.5–2 (2.5) cm. long; stamen tube 1 cm. long, little exceeded by the styles; fruit enclosed in calyx, the carpels reniform.—Var. *macrantha* R.E. Fr. Sv. Vet. Akad. Handl. ser. 3. 24, no. 2: 3. 1947 has larger leaves, strongly cordate sepals 13–16 mm. long, 7–9 mm. wide, corolla to 2.5 cm. long, scarcely a genetic variant. *P. lomageiton*, unknown to the lomas, with much larger leaves and flowers is allied to *P. velutina* Hill & Ulbr. of the lomas with different leaves, larger flowers (Ulbrich). Entire plant is said to be strongly musk-scented. My specimens were from loose stony upper slopes of seaside hills, Murphy's from sheltered hollows among summit rocks. F.M. Neg. 29772.

Lima: Huara, *Ruiz & Pavón;* sands, *Dombey*, type. San Lorenzo, *Gaudichaud; Mathews 1010* (type, var. *macrantha*). Chorillos, *5872; Weberbauer 14;* 146. Callao, *Andersson; Wilkes' Exped.* San Gallen, *Murphy 3476* (det. Johnston).—Ica: Lomas, 500 meters, Bahía de la Independencia, *Weberbauer 7961*, (type, *P. lomageiton*). Chile.

Palaua rhombifolia Graham, Edinb. New Phil. Journ. 369. 1830.

Sprawling-ascending annual, the weak stems, slender petioles, these 1–3 cm. long, and leaves beneath lightly hispid-stellate, the latter as the carpels without soon glabrous or nearly so; leaves alike but reduced above, ovate-rotund or -elliptic, often about 2 cm. wide and long, sometimes three times as large, somewhat irregularly crenate-lobulate; peduncles 3–4 cm. long, densely hirsute; calyx about 8 mm. long, the broadly ovate lobes acute, canescent puberulent within; petals about 12–18 mm. long, or longer, bright rose-red, the narrow claws densely ciliate; fruits about 7 mm. across.—Illustrated, Bot. Reg. *pl. 1375;* also Bot. Mag. *pl. 3100.* F.M. Negs. 23761; 23762.

Ancash: Lomas de Mongón, *Goodspeed Exped. 9175* (det. Johnston).—Lima: Near Lima, *Cruckshanks*, type. Sandy lomas along the sea, Lurín, *5921* (det. Johnston). Ancón, *Grant 7469.* Loma Pasomayo, *Stork & Vargas 9355* (det. Johnston).

Palaua tomentosa Hochr. Ann. Cons. Jard. Bot. Genève 5: 171. 1901.

Spreading-ascending more or less stellate-tomentose annual, the broadly ovate or subrotund leaves less densely so above; stipules subulate, slightly ciliate; petioles (1) 5–9 cm. long, the longer basal especially sparsely long-pilose; leaves cordulate or subtruncate at base, rather obscurely and unevenly 3–5-lobulate and coarsely dentate the larger teeth mucronulate, the younger tomentose both sides, the older greenish above, all 7–9-nerved, about 5 cm. long and wide or the basal somewhat larger, progressively smaller toward the tops of the elongating stems; peduncles 3.5–5 cm. long, articulate above the middle; buds subglobose; calyx 8–9 mm. long, reddish tomentose below, the subcordate ovate acute lobes 5–6 mm. long, 3–4 mm. wide near the base, sparsely setose within; petals obovate, typically 1.5–2 cm. long, lilac or pink, paler below; stamen tube as styles 8 mm. long; carpels many.—Stamens deep red, petals pink to lavender, white in center (Worth & Morrison). This plant could not be Mexican, as the type label indicates. F.M. Neg. 23763.

Arequipa: Loma near Atiquipa, *Worth & Morrison 15672.* Sandy quebradas, Atiquipa, *Worth & Morrison 15629.*—Moquehua: Torata, *Weberbauer 7420?* (flowers smaller). Without locality, *Pavón,* (type, Herb. Genève).

Palaua velutina Ulbr. & Hill, Bot. Jahrb. 42: 108. 1908.

Habit of the generally similar *P. moschata* but as to type much more open in growth, the slenderer stems and branches with fewer irregularly crenate and lobulate ovate-elliptic leaves 2–4.5 cm. long, 1–2.5 mm. wide, the close indument velutinous; flowers purplish, 2.5–3 cm. in diameter; calyx cupulate, 12 mm. long, the lobes ovate-deltoid, acute, 6–7 mm. long; petals obovate, claw ciliate, 1.5–2 cm. long, 8–10 mm. wide; stamen tube 6–7 mm. long; carpels many, 2 mm. long, rugulose only dorsally.—F.M. Neg. 9258.

Arequipa: Loma sands (*Guenther & Buchtien 192;* and between rocks, *192a,* both det. Ulbrich). Lomas near Mollendo, *Weberbauer 1493.*—Tacna: Near Lacumba, 1,500 meters, *Woitschach,* type.

Palaua Weberbaueri Ulbr. Bot. Jahrb. 42: 110. 1908.

Annual, simple or laxly branched, stellulate pubescent including the calyces, only the subulate-lanceolate persisting stipules (4–5 mm. long) pilose with simple trichomes; petioles 2–3 (5) cm. long; basal leaves rotund obovate or suborbicular, irregularly coarsely crenate or sublobulate-crenate, the upper leaves rotund-ovate,

3–5-lobed the larger terminal lobe obovate, the lateral obliquely ovate, all coarsely and unevenly crenate-lobulate, all forms variable in size, 2–4.5 cm. long, 1.5–4.5 cm. wide, cordate to subtruncate at base, rather densely stellulate, the nerves prominent beneath; flowers subumbellate in the upper axils on pedicels 2–6 cm. long; calyx cupulate, 5–6 mm. long, the lobes obovate-acuminate, 4 mm. long and wide above the base; petals about 1 cm. long, nearly as wide, red or purple, ciliate and inconspicuously glandular at base; stamen tube 6–7 mm. long, glabrous, as the styles and ovary.—*P. rhombifolia* var. *acaulis* Hochr. seems to be a young plant. This probably should be included in *P. tomentosa*. F.M. Neg. 9259.

Arequipa: In Lomas near Mollendo, *Weberbauer 1470*, type; *Hitchcock 22420; Mexia 04168* (det. Johnston, *P. dissecta*); (*Günther & Buchtien 227*, det. Ulbrich). Mejía *Günther & Buchtien 228*. Pasco, 575 meters, *Cook & Gilbert 50* (det. Ulbrich); (*Günther & Buchtien 226*, det. Ulbrich).—Moquehua: Torata, *Weberbauer 7420; 7420A?* Without locality, *Mathews 912*. "Corilla" (Mexia).

2. MALVAVISCUS [Dill.] Adans.

Reference: Schery, Ann. Mo. Bot. Gard. 29: 183–244. 1942.

Shrubs, sometimes arborescent, the solitary axillary or terminal or subterminal flowers usually bright red, the corolla funnelform, the petals connivent (or spreading only apically) and auriculate on one side of the claw, the stamen column usually long-exserted. Involucel present. Stigmas apical. Ovules solitary, ascending. Fruit baccate, the 5 uniseriate indehiscent carpels enclosed in a fleshy envelope until full maturity but this character is not apparent in old fruits (Schery).—Schery considers the Peruvian shrub as constituting one species as indicated below in the synonymy; this may be the correct interpretation but types (unfortunately) have not been designated nor typical forms described even for the earliest name. The Peruvian shrub is at least expediently divisible into two variants or species and since there is disagreement as to their disposition a key to them is given after the description of the original species without an implied opinion by me. See *Hibiscus spiralis* for *M. Poeppigii* (Spreng.) G. Don, possibly *M. aboreus* Cav. according to Schery.

Malvaviscus arboreus Cav. Diss. 3: 131, *pl. 48*. 1787; 209. *M. Balbisii* DC. Prodr. 1: 445. 1824; also *M. mollis* DC. l.c., fide Schery.

Shrub or straggling in other vegetation, rarely several meters tall, the indument tomentose to scabrous-stellate sometimes nearly lacking especially on the leaves above, these more or less lobed to entire; flowers about 3–5.5 cm. long; involucel usually densely pubescent the linear-lanceolate to spatulate segments subequaling or exceeding the variously pubescent calyx, its lobes commonly subdeltoid; petals often deeply retuse; stamen column finally exserted ordinarily for one-fourth to one-third its length (after Schery). The type from Mexico with the following characters: Tree with cordate crenate subtrilobed acuminate tomentose leaves, the middle lobe more produced; stipules setaceous, small, marcescent; peduncles villous, axillary, solitary, shorter than petioles; bractlets 8, linear; calyx tubular, 10-striate; corolla suffussed-red (Cavanilles).—Illustrated, Schery, l.c. text figures and *pls. 14–17*.

Peru (see below). Central America; Mexico; West Indies.—Doubtfully in Peru at least typically but varietally, subspecifically or perhaps specifically divisible as follows:

Calyx subturbinate or short-cylindric, at anthesis scarcely twice longer than wide or at maturity scarcely enclosing the fruit. *M. arboreus*, typical.

Calyx at least twice as long as broad at anthesis, at maturity obviously enclosing the fruit.

Bractlets distinct in anthesis, rarely 3 mm. wide. var. *longifolius* or *M. longifolius*.

Bractlets subimbricate even in anthesis; petal auricle 1 cm. long. var. *Williamsii* or *M. Williamsii*.

Malvaviscus longifolius Garcke in Otto & Dietr. Allg. Gartenz. 22: 321. 1854. *M. arboreus* Cav. var. *longifolius* (Garcke) Schery, Ann. Mo. Bot. Gard. 29: 218. 1942. *M. cuspidatus* Turcz. Bull. Soc. Nat. Mosc. 31, pt. 1: 190. 1858. *M. maynensis* Huber, Bol. Mus. Goeldi 4: 583. 1906. *M. Ulei* Ulbr. Notizbl. Bot. Gart. Berlin 6: 328. 1915.

Like *M. arboreus* highly variable in leaf-lobation and pubescence but the calyx long-cylindric, contracted above to enclose the fruit within the tube and perhaps not stabilized even as regards its character, as suggested by Schery but in Peru apparently distinct. —Synonymy after Schery; more or less villous-stellate specimens det. Schery as *M. aboreus; M. maynensis* as to type has subglabrous leaves truncate or obscurely cordate at base, the branches glabrous

or puberulent, *M. Ulei* subentire openly cordate or scarcely cordate leaves, indument a short puberulence. F.M. Neg. 9430 (*M. Ulei*).

San Martín: Juanjuí, *Klug 4382; 3919*. Boquerón, *Allard 22074*. —Huánuco: Divisoria, *Woytkowski 34559*.—Junín: Juaja (*Univ. of Lima 13*). Chanchamayo Valley, *Schunke A116; 21; 1492*. San Ramón, *Killip & Smith 24714*. Puerto Bermudez, *Killip & Smith 26648*.—Ayacucho: Estrella, *Killip & Smith 23065*.—Loreto: Río Ucayali, *Huber 1383* (type, *M. maynensis*). Balsapuerto, *Klug 3015*. Iquitos, *Williams 8068* (det. Ulbrich, *M. maynensis*). Río Nanay, *Williams 508*. La Victoria, *Williams 2675* (det. Ulbrich, *M. cuspidatus*). To Colombia.

Malvaviscus Williamsii Ulbr. Notizbl. Bot. Gart. Berlin 11: 545. 1932. *M. arboreus* Cav. var. *Williamsii* (Ulbr.) Schery, Ann. Mo. Bot. Gard. 29: 227. 1942.

Terete younger branches scabrous-tomentulose; stipules triangular-lanceolate, 4 mm. long, half as wide; petioles tomentose, 5–8 cm. long; leaves cordate-orbicular, 8–11 cm. long, 9–12 cm. wide, coarsely but rather regularly crenate, membranous, minutely and sparsely stellulate on both sides, a little tomentose on the nerves; peduncles 1.5–3 cm. long; involucel bractlets 9–11, ovate, acutish, membranous, obscurely stellulate, 1 cm. wide, 1.5 cm. long, nearly as long as the campanulate scabrous tomentose calyx, this softly tomentose within the lobes, 4 mm. long, 5 mm. wide at base; corolla roseate, 4–4.5 cm. long, 6–7 cm. across, the oblong petals 2–2.5 cm. wide with a lateral triangular appendage nearly 1 cm. long, fimbriate, also slightly stellulate and simply pilose; ovary subglabrous; stamen tube 6 cm. long, glandular styles pilose; fruiting involucre and calyx subindurate, carpels 8 mm. high.—Nearest *M. Balbisii* DC. with smaller involucre and leaves (Ulbrich). Probably only a var. of *M. longifolius* or a subvar. if that is treated as a variant of *M. arboreus*. Curiously, type apparently not seen by Schery, who wrote, "Only variety with large broad involucral lobes."

Loreto: Forest, Río Nanay to Río Napo, *Williams 706*, type. Florida, *Klug 2077*. Colombia.

3. MALACHRA L.

Reference: Hochreutiner, Ann. Cons. Jard. Bot. Genève 20: 144–149. 1917.

Perennial herbs or more or less suffrutescent, marked by the clustered flowers often attached to conspicuously venose foliaceous

bracts, rarely with involucre, each flower provided with subulate-filiform bractlets, or sometimes the inner flowers subtended by narrow stipules. Anthers subsessile, the tube truncate or 5-denticulate. Ovary cells 5, the solitary ovule ascending; style branches 10, apically capitate-stigmatose. Carpels uniseriate, indehiscent or opening vertically toward base.—Probably not more than nine species, some extremely variable and difficult to define (Kearney); see also Gürke, Bot. Jahrb. 16: 345. 1893. Hochreutiner suggested, l.c. 144–145, that varieties could take care of the more stabilized characters of the two or three established entities.

Indument canescent-tomentose or appressed on stems; inflorescences more or less peduncled.....*M. capitata.*

Indument spreading, hispid; inflorescences sessile or subsessile. *M. alceifolia.*

Malachra alceifolia Jacq. Coll. Bot. 2: 350. 1788. *M. fasciata* Jacq., l.c. 352.

Abundantly hispid or rarely sparsely with spreading yellowish simple and stellate trichomes, erect, sometimes a meter or two tall; lower leaves cordate, 3–5-lobed or angled, the upper rounded at base and more or less serrate or lobate, all subrotund, glabrous or asperous or sparsely hispidulous, usually at least about a dm. long and wide; stipules 1–2 (3) cm. long; capitate inflorescences sessile or more or less pedunculate; bracts broadly ovate, deeply to slightly cordate, acute to acuminate, sessile to petiolate, often pellucid-membranous especially below in age, dentate or entire, the outer to 2.5 cm. long; calyx membranous, the lobes aristate, 5–8 mm. long in flower, longer in fruit; petals yellowish, white or pink-tinted, 1–1.5 cm. long; carpels 3–3.5 mm. long, usually persistent.—Gürke, l.c., retained *M. fasciata* and described several forms but the leaves and bracts are variously subentire to lobed, obtuse to acute, the carpels pilose to reticulate and glabrous (*M. fasciata*); varieties could be designated, as *M. fasciata*, the bracts rounded to subcordate, the leaf-lobes acute. F.M. Neg. 32649 (*M. fasciata*).

Ancash: Santa, *Stork & Horton 9154* (det. Johnston).—Lima: To Ancón, *Mexia 8103* (det. Killip).—Loreto: Pucallpa, *Soukup 3076* (det. Rudd). Yurimaguas, *Williams 4047*. Río Nanay, *Williams 447*. Río Itaya, *Williams 212*. To the West Indies. "Malva."

Malachra capitata L. Syst. Nat. ed. 12: 458. 1767. *M. ruderalis* Gürke in Mart. Fl. Bras. 12, pt. 3: 460. 1892. *M. Poeppigii* Gürke, Bot. Jahrb. 16: 347. 1893.

Entire plant canescent with a fine indument mostly of stellulate and simple trichomes intermixed or the latter lacking; lower leaves subrotund, usually 5-lobed, the upper 3-lobed or undivided, all rounded or obtuse at base, unequally serrate, the larger leaves 6–10 cm. long, 4–7 cm. wide; heads solitary, or 2–3 in the upper axils or terminal; bracts plane or conduplicate, the sometimes revolute margins entire or with 1–2 teeth, sessile or subsessile, cordate, to 2 cm. long; calyx 6–8 mm. long, the ovate lobes obtuse; petals 1 cm. long; carpels 3 mm. long.—*M. ruderalis* is the form or variety with medially conduplicate revolute marginal bracts which appears to be a condition scarcely of genetic origin. A photograph of the type shows clearly, I think, that the species of Linnaeus is the basic entity here; the two species of Gürke are the same as pointed out by Hochreutiner, and may constitute at least a variety. A common weed. Illustrated, Cav. Diss. 1: *pl. 33, fig. 1*. F.M. Neg. 9420 (*M. ruderalis*).

San Martín: San Roque, *Williams 7775*. Juanjuí, *Allard 22512* (det. Lyman Smith). Tarapoto, *Williams 5656*.—Loreto: Yurimaguas, *Poeppig 2232* (type, *M. ruderalis*, *M. Poeppigii*); *Williams 4368*. Rancho Indiana, *Mexia 6419a*. Near Iquitos, *Williams 1311; 1444; Klug 438; 784*. Río Nanay, *Williams 779; 1252*. Río Itaya, *Williams 3234*. Pebas, *Williams 1586*. La Victoria, *Williams 3029*. Bolivia to Colombia. "Malva."

4. URENA L.

Reference: Hochreutiner, Ann. Cons. Jard. Bot. Genève 5: 131–146. 1901.

Herbs or shrubby, the leaves usually angled or lobulate, the small flowers commonly glomerate in the axils and involucrate by the 5 connate bractlets. Stamen tube truncate or 5-denticulate, the anthers subsessile. Carpels 5, usually glochidiate.—Otherwise like *Malachra*, the styles also 10. The leaves commonly have 1–3 narrow thick-margined glands at the base of the medial nerves beneath. See also Gürke, Bot. Jahrb. 16: 330–385. 1893, for the original revision.

Urena lobata L. Sp. Pl. 692. 1753; 136.

Highly variable vegetatively; leaves typically subrotund, angulate, usually cordate at base, the obscure lobes acute or palmately

parted or serrate or deeply sinuate, glabrous to tomentose; calyx 5–7 mm. long, usually slightly shorter than the involucel; petals 1–2 cm. long; carpels about 6 mm. long.—*U. sinuata* L., if found, may be recognized by its leaves lobed medially or more deeply. Hochreutiner recognized and defined (modifying Gürke's treatment) a dozen variants; a meter-tall shrub with bright lilac flowers, in clearing (Klug). Illustrated, Bot. Mag. *pl. 3043;* Fawcett & Rendle, Fl. Jam. 5: 127.

Loreto: Mishuyacu, *Klug 944* (det. Ulbrich). Nearly cosmopolitan in warm regions.

5. PAVONIA Cav.

More or less ligneous, or rarely completely herbaceous with serrate, entire or angulate-lobed often pellucid-punctate leaves and variously colored flowers solitary and peduncled in the axils or clustered at the ends of the branches. Bractlets 5–many, distinct or more or less connate basally and with the calyx. Carpels obovoid-trigonous, never glochidiate but sometimes echinulate and often 1–3-aristate or -rostrate, often separating septicidally. According to Hochreutiner carpels early or tardily dehiscent, also loculicidally, except in species with obsolete dorsal nerve, while those of *P. spinifex* (et cetera with thick-walled carpels) split open only upon germination. Style branches and stigmas always 10 but ovary with 5 monospermed loculi (B.P.G.H.).

Two keys are given, the one based on fruiting characters kindly contributed by Dr. Hochreutiner; however, the vegetative key, while not accounting for leaf-variations, will lead to most flowering specimens, otherwise scarcely determinable.

Carpels with long hamate-pilose awns; leaves usually more than twice as long as wide; flowers solitary in the axils or grouped at end of stem or branches.

Awns narrow, nearly filiform; carpel body transversely rugose.

Leaves cordate or subcordate; bractlets 10–16 mm. long. *P. spinifex.*

Leaves not cordate; bractlets 4–8 mm. long. . . . . *P. sepium.*

Awns unequal or shorter than carpels, these not distinctly transversely rugose.

Bractlets 5–6, ovate; inflorescence densely umbellate. *P. fruticosa.*

Bractlets 8–10, linear; inflorescence laxly paniculate.

Bractlets much longer than calyx.

P. oxyphyllaria, P. peruviana.

Calyx much longer than bractlets.....*P. leucantha.*

Carpels awnless, sometimes only mucronate, smooth; inflorescence capituliform.....*P. Riedelii.*

Carpels awnless, smooth or rugose, muticous or gibbous.

Stipules lanceolate; petals yellow.....*P. spicata, P. paniculata.*

Stipules filiform; petals yellow.....*P. sidaefolia.*

Petals red.....*P. mollis.*

VEGETATIVE KEY

Flowers solitary in the axils (rarely lateral and 2), at least 1.5 cm. long (unless rarely in *P. sepium*).

Leaves ovate to oblong-elliptic, at most 2–3 times longer than wide.

Indument soft to touch.

Bractlets linear; petals cuspidate, red.....*P. mollis.*

Bractlets lanceolate; petals yellow.....*P. sidaefolia.*

Indument of leaves scabrous, at least upper surface (Peru).

Petals 2.5 cm. long or longer; leaves often somewhat cordate.

P. spinifex.

Petals less than 2 cm. long; leaves usually narrowed to base.

P. sepium.

Leaves lanceolate to oblong-lanceolate, several times longer than wide.

Flowers subsessile; bractlets expanded apically....*P. Riedelii.*

Flowers long-peduncled; bractlets linear, hispid.

P. oxyphyllaria.

Flowers all or mostly several together and always shorter than 1.5 cm.

Leaves ovate or rotund to about twice as long as wide; carpels weakly armed if at all.

Bractlets hispid, exceeding calyx.....*P. paniculata.*

Bractlets short-stellate, shorter than calyx.....*P. spicata.*

Leaves usually much more than twice as long as wide; carpels spinose at tip.

Tall, erect, with peduncled or capitate inflorescences; calyx and involucel subequal.

Stipules conspicuous; flowers capitate; carpel awns unequal. *P. fruticosa.*

Stipules minute; flowers laxly corymbose; carpel awns subequal. . . . . *P. leucantha.*

Low, ascending; stipules conspicuous; calyx and bractlets very unequal. . . . . *P. peruviana.*

Pavonia fruticosa (Mill.) Fawcett & Rendle, Fl. Jam. 5: 130. 1926. *Sida fruticosa* Mill. Gard. Dict. ed. 8. 1768. *P. typhalaea* (L.) Cav. Diss. 3: 134. 1787. *Urena typhalaea* L. Mant. 2: 258. 1771.

More or less ligneous with few if any branches, sparsely and minutely stellate pubescent, at least the tips and the leaves both sides, these oblong- or lanceolate-elliptic, sometimes rather obovate, more or less acuminate, cuneate to rounded at base, coarsely and irregularly serrate; flowers usually 5–15 or more, capitate at tips of stems and branchlets; bractlets 5–8, ovate-lanceolate, united about one-fourth, (6) 8–10 mm. long; calyx 5–7 mm. long; petals white, 10–13 mm. long, longer than stamen tube; carpels trigonous, 5–6 mm. long, dehiscing from base, smooth dorsally but with 3 apical retrorsely setose spines, the longer medial 5–7 mm. long.—Often a meter or two high. Determinations by Standley except as noted. Uittien in Pulle, Fl. Surinam 3: 434. 1941, who overlooked, l.c. 14, the Miller name, suggests that it can be discarded by calling the latter's work an "opus negligendum." Fawcett & Rendle identified the Miller plant; the corner stone of plant naming rests on the law of priority; if Uittien's idea is followed his own may well be discarded some day by new students; once disrespect for established basic nomenclatorial law occurs, it becomes a modus operandi; compare Journ. Wash. Acad. Sci. 19: 247–252. 1929. *P. rosea* Schlecht., perhaps occurring, is similar but the often roseate flowers are corymbose or loosely capitate, the bractlets linear-lanceolate. Illustrated, Mart. Fl. Bras. 12, pt. 3: *pl. 87.*

San Martín: Cainarachi, *Klug 2732.* Tarapoto, *Williams 5852* (det. Ulbrich). San Roque, *Williams 7080.*—Junín: La Merced, *5366* (det. Blake, *P. rosea*). Puerto Yessup, *Killip & Smith 26266* (det. Killip).—Huánuco: Tingo María, *Allard 21163; 21904* (det. Lyman Smith). Pampayaca, *5128* (det. Blake, *P. rosea*).—Loreto: Río Paranapura, *Klug 3953.* Iquitos, *Williams 1342* (det. Ulbrich); *8103.* Río Nanay, *Williams 429; 448* (det. Ulbrich). Caballo-

Cocha, *Williams 2124* (det. Ulbrich). Mishuyacu, *Klug 1439*. Iquitos, *Killip & Smith* 27259 (det. Killip). To Central America and the West Indies.

Pavonia leucantha Garcke, Jahrb. Bot. Gart. Berlin 1: 211. 1881.

Stem more or less appressed hirsute-stellate especially toward the apex, slender, irregularly branched above, a meter or so high; stipules 2–3 mm. long, deciduous; petioles about 1 cm. long; leaves oblong-elliptic or lanceolate, often 3–4 times longer than wide, the lower to about 1.5 dm. long, 3–6 cm. wide, rounded to somewhat acute at base, acute or acuminate, serrate, minutely appressed stellate both sides and beneath, hirtellous; corymbs 3–6-flowered the lower peduncles 5–6 mm. long, the basal bracts 5-parted, involucral bractlets 8–10, connate about medially, lanceolate, 3-nerved, 4–5 mm. long, the campanulate stellate calyx 5–6 mm. long, its deltoid acute lobes ciliate; petals 10–12 mm. long, exceeding the glabrous stamen tube; carpels glabrous, dorsally 1-nerved, 7 mm. long, the retrorsely pubescent awn 3 mm. long.—Determinations by Standley. Illustrated, Mart. Fl. Bras. 12, pt. 3: *pl. 89*. F.M Neg. 9452.

San Martín: San Roque, *Williams 6974; 7158; 7623; 7683; 7722*. Lamas, *Williams 6437*. Vitoc, *Ruiz*. Zepelacio, *Klug 3540*. Tarapoto, *Williams 6713; Woytkowski 35069* (det. Cuatrecasas).—Loreto: Río Itaya, *Williams 34; 241* (det. Ulbrich). Yurimaguas, *Poeppig 2302*, type; *Williams 5239; 5305; 5092*. Near Iquitos, *Klug 1032; Williams 8101; 8206*. Santa María, *Allard 22463* (det. Lyman Smith). Ecuador; Bolivia.

Pavonia mollis HBK. Nov. Gen. & Sp. 5: 282. 1822. *Asterochlaena cuspidata* Garcke, Bot. Zeit. 8: 668. 1850. *P. Kunthii* Gürke var. *mollis* (HBK.) Gürke in Mart. Fl. Bras. 12, pt. 3: 511. 1892. *Hibiscus cordifolius* L.f. Suppl. 309. 1781, fide Gürke, not *P. cordifolia* Wawra.

Shrub, a meter or so high, the slender flowering stems stellate puberulent and more or less hispid with somewhat glandular spreading trichomes, the subrotund-ovate cordate-based acuminate leaves softly stellate tomentose both sides or rarely sparsely so, the flowers all axillary on slender peduncles as long or longer than the leaves; stipules 3–4 mm. long; petioles to 10 cm. long; leaves to a dm. long, and nearly as wide or the upper considerably smaller, crenate-serrate; bractlets 7–9, linear, ciliate and puberulent, 8–16 mm. long, about 1

mm. wide; calyx 4–5 mm. long, stellate and somewhat hirsute; petals 1.5–2 cm. long, rose-colored, glabrous or nearly without; stamen tube glabrous, 1–1.5 cm. long; carpels muticous, reticulate-rugose, pubescent, coriaceous, about 5 mm. long, the sparsely puberulent seeds about 3–3.5 mm. long.—Fruit tardily dehiscent, loculicidally and finally septicidally (Hochreutiner). The type of *A. cuspidata* was from Guayaquil. F.M. Negs. 9438 (*A. cuspidata*); 9450.

San Martín: Tarapoto, *Williams 5792* (det. Ulbrich, *A. cuspidata*). Juanjuí, *Klug 4221* (det. Killip). Zepelacio, *Klug 3538*. Ecuador; Colombia.

Pavonia oxyphyllaria Donn. Sm. Bot. Gaz. 23: 237. 1897. *P. costaricensis* Hochr. Ann. Cons. Jard. Bot. Genève 10: 18. 1906, fide Standley.

Ligneous cylindrical stems more or less pubescent, with long reddish trichomes; stipules subulate, filiform, rufous villous as the petioles (2–5 mm. long) and peduncles, these about 1.5 cm. long, to 5 cm. long in fruit; leaves lanceolate-oblong or oblong-elliptic, acute or acuminate, serrate; peduncles axillary and congested at apex of stems, articulate in upper part; involucral bracts about 13, linear-filiform, conspicuously yellowish-red villous and setose, about 1.5 cm. long, scarcely 1 mm. wide at base; sepals about 4 mm. long, tomentose; petals obliquely obovate, retuse, pubescent both sides; fruit depressed, the 5 carpels dorsally nervose, the 3 spines about 1 cm. long with reflexed setae; seeds 5 mm. long.—Related to *P. Pseudo-Typhalaea* with larger fruits and differing from *P. Warmingiana* by the form of the fruit (Hochreutiner; description of petals after Smith). The second record for Peru, according to Ulbrich.

Loreto: Pebas, *Williams 1947* (det. Ulbrich). Costa Rica; Panama.

Pavonia paniculata Cav. Diss. 3: 135, *pl. 46, fig. 2*. 1787.

Half-shrub sometimes a meter or two high, more or less glandular and stellate pubescent, often setose with some longer simple spreading trichomes; stipules lanceolate, to 1 cm. long; petioles several to many cm. long, about equaling the ovate, angled or somewhat lobate leaves these glabrescent above or the nerves and veins stellate puberulent, cordate at base, acute or acuminate at apex (as lobes); flowers usually in a compound corymb or panicle, or solitary in the upper leaf axils; bractlets 7–12, distinct, linear, hispid, much exceeding calyx, this 5–8 mm. long, the yellow petals

sometimes twice as long; stamen tube antheriferous from base, 5–6 mm. long; carpels trigonous, 3–4 mm. long, dorsally a little rugulose, edges scabrous, apex rarely with a weak short spine.—Determinations by Standley except as noted. Illustrated, Mart. Fl. Bras. 12, pt. 3: *pl. 96*.

Lima: Río Rimac, *Safford*.—San Martín: Chuzuta, *Klug 4008*. Zepelacio, *Klug 3333*. Juanjuí, *Klug 4221*. Shores of Lake Rilami-Cocha, *Woytkowski 35126* (det. Cuatrecasas).—Huánuco: Chinchao, *Mexia 04151*. Río Marañón, *Dombey*, type. Cuchero, *Poeppig*. Near Huánuco, in thickets and along fences, *2047; 3533* (det. Hochreutiner).—Junín: Colonia Perené, *Killip & Smith 24992* (det. Killip). Oxapampa, *Soukup 2429* (det. Rudd). Satipo, *Soukup 2850*. La Merced, *Killip & Smith 23472; 24051*. Puerto Bermudez, *Killip & Smith 26622*.—Ayacucho: Aína, *Killip & Smith 23106; 22554* (det. Killip).—Loreto: Common field weed, Iquitos, *Williams 7933; 8209*. Florida, *Klug 2044*. Leticia, *Williams 3034* (det. Ulbrich, var. *corymbosa* Gürke). To the West Indies. "Malva-malva."

Pavonia peruviana Gürke in Mart. Fl. Bras. 12, pt. 3: 487. 1892. *P. parva* Ulbr. Notizbl. Bot. Gart. Berlin 11: 543. 1932. *P. nana* Ulbr. Verh. Bot. Ver. Brandenb. 50: 85. 1908, not R.E. Fries, Bull. Herb. Boiss. sér. 2. 7: 999. 1907.

Ascending-erect, the usually arcuate simple stem 1–few dm. tall, more or less simply hirsute especially above and on the leaves both sides (typically) or glabrate in age; lower petioles 1–2 cm. long; stipules linear-lanceolate, rigid, deciduous, about 1 cm. long; leaves oblong-elliptic, rounded to cuneate at base, acuminate, the larger intermediate ones to about a dm. long, a third as wide, rarely somewhat stellate pubescent, coarsely and irregularly serrate; flowers corymbosely congested, in age more or less laxly few- to several-flowered, the peduncles 5–15 (20) mm. long with a triparted basal bract; involucel turbinate, the 9–10 linear acuminate 3-nerved segments 8–11 mm. long, 1 mm. wide, sparsely long-hirsute without and ciliate; calyx campanulate, 4–5 mm. long, stellate-pubescent without, the broadly deltoid lobes ciliate; petals obovate, very obtuse, 8–10 mm. long, puberulent; stamen tube 5–6 mm. long, glabrous; carpels 5, trigonous, 1-nerved, glabrous, 9–10 mm. long, the awns about (2.5) 4–5 mm. long, erect, retrorsely setose; seeds glabrous.—*P. Warmingiana* Gürke, l.c. 488, of Brazil, to which some Peruvian specimens have been referred, was distinguished by more

dense inflorescence, less connate involucel bractlets, pilose calyx lobes, and *P. parva* from it by rose-colored exserted flowers, subequal awns; none of these characters seem to be constant or concomitant, but should be studied when more collections are available. Compare also *P. rosea* Schlecht. under *P. fruticosa*, with entire bracts, the lateral carpel awns much shorter than the medial. Illustrated, Gürke, l.c., *pl. 88*. F.M. Negs. 9458 (*P. parva*); 23705.

San Martín: San Roque, *Williams 7735* (det. Ulbrich, *P. parva*); *7637* (distr. as *P. Warmingiana*); *6988* (det. Ulbrich, *P. Warmingiana*, with query).—Huánuco: Pampayacu, *Poeppig 1584*, type. Without locality (*Mathews 644*).—Loreto: Cerro near St. Antonio de Cumbaso, *Ule 6861* (type, *P. parva*). Brazil; Colombia.

Pavonia Riedelii Gürke in Mart. Fl. Bras. 12, pt. 3: 493. 1892.

Stems slender, more or less lineately stellate-puberulent, glabrescent below, this indument also on the petioles (4–5 mm. long), peduncles (1–4 mm. long) and oblong-lanceolate leaves, especially above; stipules subulate-filiform, 3–4 mm. long; leaves subrotund or slightly cordate at base, acuminate, mostly 4–6 cm. long, 1–1.5 (2) cm. wide, irregularly serrate-crenate, gradually smaller above, becoming bractiform; inflorescences capituliform, 3–5-flowered, in the upper axils or at the tips of accessory branches; involucel bractlets 9–11, linear, hispid with simple trichomes, 5–7 mm. long, usually with a broader reflexed apical appendage; calyx cupulate, hirsute, 7–9 mm. long, the acuminate lobes 3-nerved; petals yellowish, to about 2.5 cm. long; carpels trigonous, dorsally convex, membranous, hirtellous, obtuse but shortly mucronulate, 3–4 mm. long.—F.M. Neg. 9465. Illustrated, Gürke, l.c., *pl. 91, fig. 2* (analysis).

San Martín: San Roque, *Williams 7120; 7358* (det. Ulbrich). Zepelacio, *Klug 3581* (det. Standley). Brazil.

Pavonia sepium St. Hil. Fl. Bras. Merid. 1: 225. 1827.

Much like the related *P. spinifex* and in Peru apparently merging but in general smaller in all parts; leaves usually oblong-ovate, narrowed or obtuse at base, rarely rounded or lightly cordate, often 7–10 cm. long, 3–4 cm. wide; petals 12–15 mm. long; stamen tube 8–10 mm. long; carpels 4 (–6) mm. long with spines 5–7 mm. long. —The subsp. *macrocarpa* R.E. Fr. Sv. Vet. Akad. Handl. 24, no. 2: 24. 1947 has ovate leaves long-narrowed to tip, shortly acute, rounded or rarely lightly cordate at base, early densely stellate beneath, the carpels 11–12 mm. including the 5–6 mm. long spines, a variant

apparently better treated as merely a variety. Illustrated, Mart. Fl. Bras. 12, pt. 3: *pl. 86, fig. 1.*

Cajamarca: Huancabamba, *Sandeman 4322.*—Huánuco: Near Huánuco (*Asplund 13463*, det. Fries, subsp. *macrocarpa*).—Junín: Pichis Trail, *Killip & Smith 25880* (det. Killip).—Cuzco: Machupicchu, *Herrera 3219* (distr. as *P. paniculata*). Southern South America to Colombia.

Pavonia sidaefolia HBK. Nov. Gen. & Sp. 5: 283. 1822.

Velvety tomentose even to the involucels and calyces and typically also more or less spreading hirsute with long simple trichomes; stipules 3–4 mm. long; petioles 1–4 cm. long; leaves cordate-ovate, acute, crenate, usually 4–7 cm. long, 3–4 cm. wide; peduncles axillary, 2–6 cm. long; bractlets of the involucel 6–9, lanceolate, 1–2 cm. long, 2.5–5 mm. wide; calyx 5–10 mm. long, the lobes deltoid, 5-nerved; petals yellow, red at pubescent base, 2–2.5 cm. long; stamen tube glabrous, 6–7 mm. long; carpels coriaceous, obsoletely reticulate-rugulose, 3–4 mm. long, gibbously obtuse; seeds striate, 2.5–3 mm. long.—The Peruvian plant is the var. *diuretica* (St. Hil.) Gürke without elongate trichomes. Illustrated, St. Hilaire, Pl. Usu. *pl. 53.* F.M. Neg. 9796.

The diphthong in the species name may be written "*i*" in accord with recommendation 44 of the International Rules of Botanical Nomenclature; however, when this work started it was the intent at least to follow the spelling of the author and indeed this has been found to be the sensible solution also as regards place names, native names and even the name of the author himself, since an arbitrary attempt at uniformity may be more trouble than it is worth and may even lead to greater confusion.

San Martín: Tarapoto, *Woytkowski 35043* (det. Cuatrecasas); *Williams 5539* (det. Ulbrich); also *5406; 5515.* To Venezuela, Paraguay.

Pavonia spicata Cav. Diss. 3: 136. 1787. *Malache scabra* Vogel in Trew, Pl. Sel. 50, *pl. 90.* 1772, not *P. scabra* Presl.

Shrub, the younger parts even to the calyces finely stellate-tomentose or the ovate leaves glabrate both sides except toward the cordate base; glandulosity lacking; stipules linear-lanceolate, often a cm. long; petioles about a third as long as the leaves, these narrowly acuminate, entire or minutely serrate-dentate, often about a dm. long or longer; flowers in terminal sometimes more or less

corymbose racemes; bractlets 8–10, oblong-lanceolate, shorter than calyx, this 12–13 mm. long; the greenish-yellow petals 1.5–2 cm. long; stamen tube 1.5 cm. long; carpels acutely trigonous, 9–11 mm. long, dehiscent within medially, sometimes crested dorsally, bluntly 3-cusped apically.

Peru (probably). Tropical South America to Florida.

Pavonia spinifex (L.) Cav. Diss. 3: 133, *pl. 45, fig. 2.* 1787. *Hibiscus spinifex* L. Syst. Nat. ed. 10. 1149. 1759.

Glabrescent or lightly stellate-puberulent shrub or half-shrub with rather large mostly solitary axillary yellow flowers and irregularly serrate ovate leaves; stipules to about 1 cm. long; petioles 1–3 cm. long or the lower twice as long; leaves usually somewhat cordate, the lowest to 12 cm. long, 8 cm. wide; peduncles usually 1–4 cm. long; bractlets nearly distinct; calyx deeply parted, 9–12 mm. long; petals yellow, 2–3 cm. long, sometimes larger, usually exceeded by the stamen tube; carpels 4–6 mm. long, indehiscent, transversely rugulose dorsally and with 3 ribs terminating at apex in retrorsely setose spines 5–10 mm. long.—Illustrated, Fawcett and Rendle, Fl. Jam. 5: 129; Mart. Fl. Bras. 12, pt. 3: *pl. 85.*

Cajamarca: Prov. Hualgayoc, *Soukup 3852.*—Huánuco: Pampayacu, *Sawada 65.* Huánuco, *2048.* Mito, *1570.* Huacho, *Stork & Horton 9411* (det. Standley).—Cuzco: Abandoned field, Echarate, *Goodspeed Exped. 10452* (det. Standley). San Miguel, *Cook & Gilbert 1037; 1071.* Machupicchu, *Vargas 2081.* Warm and tropical America. "Anguia," "taroca-asta," "cuerno de venado" (Cook & Gilbert).

6. HIBISCUS L.

Reference: Hochreutiner, Ann. Cons. Jard. Bot. Genève 4: 23–191. 1900.

Shrubs or vigorous herbs, rarely arborescent, with mostly showy flowers involucrate by several to many usually narrow, rarely reduced free or somewhat connate bractlets. Leaves various. Stamens disposed evenly or unevenly below the truncate or dentate column apex. Ovary cells 5, each (2) 3–many-ovuled. Style branches 5, the stigmatic part globose or spatulate-dilated. Capsules loculicidal, rarely ligneous, sometimes with false partitions, the seeds usually reniform, glabrous or pubescent. Bractlets rarely bifurcate at tip, sometimes simple in part in the same involucel.

The detailed monograph of Hochreutiner is without descriptions but replete with synonymy and keys, with many critical notes and observations. Since the Peruvian species are mostly relics from cultivation and popular ornamentals in many plazas, a purely artificial key is appended to facilitate their identification.

Peduncles shorter than flowers.
Leaves rotund-reniform, entire, green above, canescent beneath. *H. tiliaceus.*
Leaves serrate to lobed, glabrescent or pubescent on both sides.
Flowers about 4 cm. long; plants glabrescent...*H. cannabinus.*
Flowers larger; plants more or less pubescent.
Bractlets typically forked apically; leaves often rather cordate-ovate.
Bractlets longer than calyx, stellate-hirsute.
Stems aculeate-verruculose.....*H. bifurcatus.*
Stems not aculeate.....*H. furcellatus.*
Bractlets shorter than calyx, puberulent....*H. peruvianus.*
Bractlets simple; leaves all oblong-lanceolate, often tomentose.....*H. Lambertianus.*
Peduncles mostly (or all) at least soon longer than flowers.
Petioles, peduncles, often leaves beneath densely pubescent.
Leaf lobes acute; calyx soon inflated.....*H. mutabilis.*
Leaf lobes rounded; calyx little accrescent.....*H. Hitchcockii.*
Petioles, peduncles, leaves glabrous or only early pubescent.
Flowers about 2 cm. long; bractlets often exceeding calyx.
Sepals more than half connate.....*H. spiralis.*
Sepals free or less than half connate. *H. Cavanillesianus, H. brasiliensis.*
Flowers much larger; bractlets at most equaling calyx.
Petals entire; bractlets and calyx subequal.
Bracts as calyces glabrous or trichomes fine; leaves often lobed, minutely serrate.....*H. Sabdariffa.*
Bracts as calyces setose; leaves coarsely serrate. *H. rosa-sinensis.*
Petals dissected; bractlets minute.....*H. schizopetalus.*

Hibiscus bifurcatus Cav. Diss. 3: 146, *pl. 51.* 1787; 108.

Glabrescent or setose, but stems, petioles and leaf midnerve more or less prickly, the lower leaves typically deeply and acutely

lobed, sometimes sub-hastate, often nearly glabrous, cordate, the upper leaves ovate-lanceolate, acuminate, all acutely serrate and with a gland on midnerve; peduncles shorter than calyces these becoming coriaceous, nervose with a medial nerve for each lobe and sinus, the latter nerve parted at sinus to extend marginally on each lobe anastomosing at apex with the medial nerve; flowers axillary and apically spicate, pink or violet; bractlets linear-filiform, conspicuously forked at tip, free but joined at base to calyx; capsules barely included, ovoid, acute, flavescent-pubescent; seeds 3 mm. long, glabrous.

Peru (probably). Tropical and subtropical America.

Hibiscus brasiliensis L. Sp. Pl. ed. 2. 977. 1763; 87. *H. phoeniceus* Jacq. Hort. Vindob. 3: 11, *pl. 14*. 1776, fide Hochreutiner.

Slender-stemmed soon glabrescent shrubs sometimes several meters high; petioles about 1.5 cm. long; leaves ovate, truncate or subcordate at base, acuminate, sometimes the lower deeply 3-lobed, those of the flowering branches often about 6 cm. long, 4 cm. wide; peduncles typically elongate, articulate about medially; bracts narrowly linear, glabrous or nearly, usually 2 cm. long, equaling or much exceeding the subglabrous calyx, nearly equally wide from base to apex; calyx deeply lobed, 10–12 mm. long, the ovate lanceolate lobes acuminate; flowers rose-colored or rarely white, 1.5–2 cm. long.—The var. *sylvaticus* (Benth.) Hochr. has the larger lower leaves deeply 3-lobed, 8–9 cm. long, 12–16 cm. wide; var. *luteus* [Pavón] Hochr. has yellowish rigid stellate trichomes especially on the stems and leaves beneath, peduncles articulate in the upper one-fifth and bractlets densely ciliate. This could well be *H. Cavanillesianus* HBK. but compare note under that species.

Tumbez: Rainy-green formation, southeast of Hacienda La Choza, *Weberbauer 7717* (det. Ulbrich, *H. phoeniceus*).—Loreto: In garden, Caballo-Cocha, *Williams 2373* (det. Standley). Northern South America and the West Indies.

Hibiscus cannabinus L. Syst. Nat. ed. 10. 1149. 1759; 114. *H. unidens* Lindl. Bot. Reg. 10: *pl. 878*. 1825.

Highly variable in size and contour of leaves, indument and presence of glands on calyx, the bracts simple or more or less bifurcate; petioles and leaves subequal, the latter usually glabrescent, more or less deeply 3-lobed or -parted, the ovate or oblong-lanceolate lobes acute or acuminate, serrate; peduncles short or flowers even

subsessile, these often about 3 cm. long; bracts connate at base, linear, commonly simple, rarely one or more somewhat 2-forked at tip, subequaling the calyx, its acuminate lobes as the bracts with a few rigid hyaline trichomes, these also present on the shorter ligneous pointed capsules.—The var. *unidens* (Lindl.) Hochr. l.c. 115, has the involucel more or less forked.

This has been cultivated as a source of fiber.

Loreto: In garden, Fortaleza, *Williams 4508;* also at Nanay, but apparently wild, *422* (both det. Standley). Old and New World tropics.

Hibiscus Cavanillesianus HBK. Nov. Gen. & Sp. 5: 290. 1822; 124.

Shrubby, a meter high or higher, with smooth glabrous stems; branchlets hispid-stellate; stipules persisting, 6–8 mm. long; petioles 8–10 mm. long; leaves subrhombic to ovate-oblong, acute at base, narrowly acuminate, 3.5 cm. long or longer, about 2.5 cm. wide, lightly pubescent on both sides or especially beneath, the indument appressed with rigid scattered stellate trichomes, coarsely and irregularly serrate; peduncles at apex of axillary branchlets about 8 mm. long, shortly hispid as the 10–11 linear subspreading bractlets; calyx lobes ovate, acute, 3-nerved; petals violet, suborbicular, stellate-pubescent without, 14–16 mm. long; styles 5; ovules 6; carpels depressed, ovate, hirsute; seeds 4.—Hochreutiner remarks: very doubtful species, placed in *Furcaria* group with simple bractlets from the description of the calyx, but type not at Paris. However, compare *H. brasiliensis,* var. *luteus* with pubescent bractlets. Hochreutiner suggests to me that species should be suppressed as diagnosis omits seeds and permits only hypothesis; however, it will probably be identified by recollection at type locality.

Cajamarca: Near Tomependa; Bracamores de Jaén (*Bonpland,* type).

Hibiscus furcellatus Desr. in Lam. Encycl. 3: 358. 1789; 107.

Similar to *H. bifurcatus* but bractlets often less or not at all forked and all younger parts more or less tomentose-scabrous with brownish-gray stellate trichomes; leaves usually entire or angulate, more or less obscurely dentate; calyx shorter than involucel the acute lobes glanduliferous; petals 6–8 cm. long, red.—The var. *Diodon* (DC.) Uitt., Pulle, Fl. Surinam 3: 21. 1932, has 3–5-lobed leaves, bractlets more or less bifurcate, var. *afurca* Uitt., the bract-

lets entire; the species therefore seems to merge with typical *H. bifurcatus* and probably represents a phase of it, the characters apparently variable, not consistently concomitant, even intangible. F.M. Negs. 7988; 23725; 23726 (type and vars.). Illustrated, Rodrigo, Rev. Mus. de la Plata n. ser. 7, Bot.: 119.

Huánuco: Divisoria, *Woytkowski 34555?* Tropical and subtropical America.

Hibiscus Hitchcockii Ulbr. ex Kearney, Leafl. West. Bot. 7: 271. 1955.

Shrub, about 2 meters tall, the younger parts minutely stellate-tomentose, the leaves becoming glabrescent above; petioles about a third as long as the suborbicular blades, these at least 11 cm. long, with or without a shallow open sinus, shortly 3–5-lobed, the rounded lobes sparsely crenate; peduncles often longer than 9 cm., solitary in the upper axils or subcorymbosely clustered at the apex of the stem and the few branches; involucel of 8–9 bractlets 12–18 mm. long, the conduplicate ovate blade—this nearly 1 cm. wide—much longer than the subcylindric lower portion; calyx at anthesis 19–22 mm. long, cleft nearly to base, the lanceolate acuminate 5-nerved lobes eglandular; corolla funnelform-campanulate, the roseate petals scurfy puberulent without, 6–7 cm. long; stamen tube much shorter than style, this included, the stout branches clavate; capsule ovoid, 2–2.5 cm. long, scurfy puberulent, equaling or subequaling calyx, the rigid valve-cusps 4 mm. long, very sharp; seeds densely lanate.—Characters of involucel suggest relationship to *H. sororius* L. f., which was placed by Hochreutiner in his revision, l.c. 166, 167, in his section *Spatula*, but he characterized this section as having glabrous seeds (Kearney); in Peru *H. sororius* L. f. resembles most *H. furcellatus* Desr. but the similarly dilated bractlets are not forked, the leaves not lobed; as Kearney remarks, Ulbrich's species appears to be very distinct; type from near Guayaquil.

Piura: between Canchaque and Serrán, Prov. Huancabamba, *Stork 11421* (det. Johnston). Ecuador.

Hibiscus Lambertianus HBK. Nov. Gen. & Sp. 5: 291, *pl. 478*. 1821; 142. *H. salviaefolius* St. Hil. Fl. Bras. Merid. 1: 249. 1827, fide Hochreutiner.

Slender, typically canescent-tomentose, velvety in Peru, or in type leaves more hirsute above (in a variety glabrous) these oblong- or ovate-lanceolate, serrulate, truncate at base, acute to acuminate,

often about 1 dm. long, 3–3.5 cm. wide; peduncles short; bractlets linear, free, simple, shorter than the soon inflated shortly lobed calyx, the broad lobes without marginal nerves; petals about 1 dm. long; capsules included, short-setulose.—The flowers of the Peruvian specimen noted by collector as pale purple, darker at base, column purple, stigma white; the leaves are about equally velvety-tomentulose both sides and acute rather than acuminate, in this resembling the St. Hilaire type to which it was referred. F.M. Negs. 35500; 23729 (last two, vars.); 35499 (*H. salviaefolius*). Illustrated, Rev. Mus. de la Plata n. ser. 7, Bot.: 133.

San Martín: Shores of Lake Rikuri-Cocha, Tarapoto, *Woytkowski 35124*. Colombia to Brazil and Paraguay.

Hibiscus mutabilis L. Sp. Pl. 694. 1753; 147.

Shrubs or small trees with ample cordate-rotund less than medially lobed leaves, the lobes acute, and large flowers that characteristically change color, commonly opening white, becoming roseate and finally yellowish; indument close, scurfy-stellate, especially dense on the upper stems, bracts and calyces, the second free, narrowly lance-linear, soon shorter than the quickly enlarged or in fruit much inflated calyx, its broadly ovate acuminate lobes nervose but not marginally; capsules included, the seeds lanuginose. —Probably originally from China or Japan, but long established in South America and tropical America. Determinations by Standley.

Loreto: La Victoria, *Williams 2760*. Lower Río Huallaga, *Williams 4855*. Río Marañón Valley, *Dennis 29167* (det. Killip). Río Itaya, *Williams 215*. Tropical regions. "Flor variable."

Hibiscus peruvianus R. E. Fr. in Sv. Vet. Akad. Handl. ser. 3. 24, no. 2: 31. 1947.

Branchlets, petioles and leaves beneath canescently stellate-puberulent, glabrescent in age, and more or less minutely aculeate with recurved yellowish prickles; petioles to 7 cm. long; leaves ovate-triangular, basally truncate or slightly and openly cordate, to one-third sinuately 3–5-lobate, the divergent deltoid lobes acute or the uppermost leaves little if at all lobed, all irregularly crenate, the largest 6–10 cm. long and broad, membranous, green, glabrous above except slightly hirsute on the principal nerves, early minutely stellate-pubescent beneath; flowers solitary in the axils; pedicels 2.5–3 cm. long, to 6 cm. long in fruit, shortly and densely cinereous-tomentulose, sometimes abundantly aculeate; involucral bractlets 9–10,

densely puberulent with rigid stellulate trichomes, linear, about 12 mm. long and 1 mm. broad, bifurcate apically; calyx cupulate, canescent-tomentulose, about 1.5 cm. long, the lanceolate-deltoid acute 3-nerved lobes with a small round gland on the medial nerve; androecium about 3.5 cm. long; ovary narrowly ovoid, acute, densely appressed yellowish-setose.—Similar to *H. bifurcatus* Cav. (and *H. furcellatus* Desr.), both of which have hirsute or hispid-stellate involucels and calyces. Illustrated, Fries, l.c., *pl. 2, figs. 11–13.*

Loreto: Florida, Ucayali (*Tessmann 3072*, type). Florida, *Klug 2182.* Santa Rosa, *Killip & Smith 28956.* Near mouth Río Marañón, *Dennis 29237.* Mishuyacu, *Klug 1473.* Caballo-Cocha, *Williams 2304* (det. Ulbrich, *H. furcellatus*). Pebas, *Williams 1862.* Nazarete, *Osgood 23; 24.*—Huancayo: Near Huanta, *Dennis 29239.* "Binaqui-ey" (Huitoto, Klug).

Hibiscus rosa-sinensis L. Sp. Pl. 694. 1753; 133.

Glabrous or essentially glabrous shrub with ovate or ovate-elliptic acute or shortly acuminate crenate serrate leaves, these mostly rounded at the base, about 8 cm. long, 4–5 cm. wide; peduncles articulate above the middle; bractlets 5–8, sublinear, shorter than the rather tubular clayx, this about 2.5 cm. long, deeply dentate; flowers 7–10 cm. long, the petals entire, the stamen column exserted, the anthers evenly disposed; capsules obovoid, seeds not lanate.—Conforming with present custom the specific name is hyphenated; commonly grown for its beauty it not infrequently is collected as an escape, only a few of many collections cited. *H. syriacus* L., totally different but conveniently noticed here as perhaps also cultivated and escaping, has basally cuneate leaves, somewhat 3-lobate, the bractlets at least equaling the calyx, the stamen column not exserted.

San Martín: Tarapoto, *Williams 5945.*—Huánuco: In the plaza, Huánuco, *Woytkowski.*—Loreto: Clearing, Mishuyacu, near Iquitos, *Klug 678.* In field near Iquitos, *Williams 8245.* Yurimaguas, *Williams 4084.* Río Itaya, *Williams 219.* Río Nanay, *Williams 433.* Caballo-Cocha, *Williams 2375; 2376.* Leticia, forest edge, *Williams 3057.* La Victoria, *Williams 2519.* Generally in the tropics. "Cucarda," "flor Betun" (Williams).

Hibiscus Sabdariffa L. Sp. Pl. 695. 1753; 116.

Glabrous or essentially except for the ciliate or setose bracts, calyces and ovoid acute capsules; leaves oblong-lanceolate, some of

them more or less hastately lobed, many merely minutely serrulate; peduncles shorter than calyces, these rigid-fleshy as the connate simple sublinear bracts, both about equal and enclosing the fruits; flowers pink or red, about 3 cm. long; capsules 2 cm. long; seeds reniform, laciniate-lepidote.

The early fleshy calyces and bracts, often reddish, are rather acid and not infrequently serve to flavor pleasantly beverages—called "Karkardi" in the Old World (B.P.G.H.)—or for confitures, and, according to Killip & Smith, the fruit is used for vinegar. A common name in many parts of the world is "Roselle" or "Rozelle," and the leaves according to the monographer are cooked and eaten as sorrel.

Loreto: Mishuyacu, near Iquitos, *Killip & Smith 29979*. Generally in warm and tropical regions.

Hibiscus schizopetalus (Mast.) Hook. f. Bot. Mag. *pl. 6524*. 1880; 131. *H. rosa-sinensis* L. var. *schizopetalus* Mast. Gard. Chron. 282. 1879.

Similar to *H. rosa-sinensis* but in flower at least strikingly distinct by the extremely long peduncles and the dissected petals, many-lobed with small spatulate lobules, and the almost minute bractlets.—It is very popular as a cultivated shrub in the tropics.

Huancayo: San Lorenzo, Río Huanta to Río Pastaza, *Dennis 29218* (det. Killip).—Loreto: Iquitos, *Williams 3545*. In forest, Caballo-Cocha, *Williams 2471*. Edge of forest, La Victoria, *Williams 2750*. Clearing, Leticia, *Williams 3061*. East tropical Africa.

Hibiscus spiralis Cav. Icon. 2: 47, *pl. 162*. 1793; 90. *Malvaviscus Poeppigii* (Spreng.) G. Don, Gen. Syst. 1: 475. 1831. *Achania Poeppigii* Spreng. Syst. 3: 100. 1826. *H. Poeppigii* (Spreng.) Gürcke, Jahresb. Nat. Ver. Halle, 133. 1850. *H. tubiflorus* DC. Prodr. 1: 447. 1824.

In general like *H. brasiliensis;* indument more or less developed, stellate-hirsute; leaves often angulately 3-lobed, 1–4 cm. long, obtuse or acutish, truncate or cordate at base, serrate; bractlets to nearly 10 mm. long, little shorter than calyx, this with acuminate lobes; corolla crimson, 2–2.5 cm. long, cylindric or the petals spreading only at tip; capsules more than 1 cm. long; seeds lanate.—Synonymy after Hochreutiner, but Schery, Ann. Mo. Bot. Gard. 29: 231. 1942, suggested that *H. Poeppigii* may be *Malvaviscus arboreus* L. var. *mexicanus* Schlecht.

Peru(?): (*Pavón*, fide Hochreutiner). Warm regions.

Hibiscus tiliaceus L. Sp. Pl. 694. 1753; 62. *H. abutiloides* Willd. Enum. Hort. Berol. 736. 1809, fide Kearney.

Tree, the branches conspicuously recurved by the bases of the large stipules; leaves rotund-reniform, deeply cordate, subentire, green and soon glabrous above, canescent beneath with a close stellulate indument; bracts foliaceous, connate, more or less distant from the calyx, this multidentate; petals nervose, broadly elliptic-rotund, 4–5 cm. long, nearly as wide, yellowish to pinkish, harshly puberulent; fruit ellipsoid, pseudo-partitioned, the many biseriate seeds reniform.—A large shrub or small tree with ligneous capsules and carpels incompletely divided longitudinally by a septum that tends to split into two membranes; sometimes regarded as generically distinct, *Pariti* Adans. or *Paritium* St. Hil. Killip and Smith (*2981*), as Ruiz and Pavón, found the species cultivated, the former at Iquitos.

Tumbez: Inner edge of Mangrove, Condesa Island, Río Tumbez, *Raimondi* (det. Ulbrich). All tropical regions.

7. ABELMOSCHUS Medic.

Like *Hibiscus* but at most subligneous and with an irregularly 2–3-lobed spathaceous calyx that is deciduous before the fruit matures.—The calyx actually is adnate at base to corolla so that it falls with the latter and stamens (Hochreutiner, Candollea 2: 83–85. 1924).

Okra or gumbo, *A. esculentus* (L.) Moench. and *A. moschatus* Medic., of the Old World, are popular in the New, particularly in warmer regions, and sometimes are found persisting after cultivation has been abandoned.

Abelmoschus moschatus Medic., Malv. 46. 1787. *Hibiscus Abelmoschus* L. Sp. Pl. 696. 1753.

Green but rather conspicuously spreading-hirsute, often a meter or so high; leaves variable, more or less palmately lobed, caudate, hastate, often strikingly when the lobes are narrow, the basal widely spreading, coarsely crenate-serrate, sometimes merely angulately-lobed on the same branch; flowers often sulphur-yellow, 5 cm. or more long; bracts linear, 6 or more, much shorter than the lance-ovoid long-pedunculate capsules.—*A. esculentus* (L.) Moench. differs particularly in having ovoid long-attenuate capsules, truncate at base, shortly peduncled. It probably also occurs as an escape from

gardens. Determinations by Standley, except as noted. Illustrated, Pflanzenfam. 3, Abt. 6: 49.

Loreto: Clearing, Peña Blanca, Río Itaya, *Killip & Smith 29669*. Florida, *Klug 2041*. Río Nanay, *Williams 352* (det. Ulbrich). Puerto Arturo, edge of forest, *Williams 5045*. Pasture weed, La Victoria, *Williams 2645; 2735; 2761*. Old World tropics. "Aya murillu" (Williams).

8. CIENFUEGOSIA Cav.

Fugosia Juss. Gen. Pl. 274. 1789.

Reference: Hutchinson, New Phytol. 46: 125–131. 1947.

Similar to the related *Hibiscus* but the 3–5 bractlets narrow and minute, often deciduous, rarely wanting, the calyx deeply 5-cleft, the 3–4-celled ovary with 3–many ovules in each cell and the apically clavate style 3–4 sulcate or with 3–4 clavate short stigmatose branches. Oil glands seriate. Fruit a loculicidal capsule, the walls becoming dry, brittle. Seeds obovoid-globose, often pubescent. —Oil glands, according to Hochreutiner, are always present.

Cienfuegosia heterophylla (Vent.) Garcke, Bonplandia 8: 148. 1860. *Redoutea heterophylla* Vent. Descr. Pl. Cels. 11, *pl. 11*. 1800. *Redoutea tripartita* HBK. Nov. Gen. & Sp. 5: 293. 1822. *Fugosia tripartita* (HBK.) Steud. Nom. encl. ed. 2, 1: 649. 1840.

Flowering as an annual but often more enduring, the slender acutely angled stems sometimes several dm. tall, nearly glabrous, the minute stellate trichomes much dispersed; leaves variable, ovate to lanceolate, shallowly to deeply lobed or tripartite, often 3–5 cm. long, 0.5–3 cm. wide; pedicels in the upper axils, about 4 cm. long or longer, enlarged beneath the gland-dotted filiform-caudate lobed calyx; flowers yellow, reddish-brown at base, 2–4 cm. long; seeds white or fulvous tomentose, the cottony indument to about 10 mm. long.—According to Svenson the Peruvian plant differs from the description of Ventenat in its pubescent style, broader calyx lobes; he suggests that *Fugosia cuneata* Benth., Bot. Voy. Sulphur 68. 1844, from Guayaquil, described as procumbent, may be a weak state. Hutchinson however separates it as an herb with entire or shallowly divided leaves, characters not apparently significant but he also found the calyx more deeply divided; the plant of southern Ecuador and Peru and probably northwards seems at most to be a variant, for convenience var. **cuneata** (Benth.) Macbr., comb.

nov. *Fugosia cuneata* Benth. l.c. Incidentally the species name of Bentham has not been transferred to *Cienfuegosia* as Hutchinson failed to cite its publication. The species becomes shrubby at base. F.M. Neg. 9790.

Piura: River gravels, La Brea (*Haught & Svenson 11584*). Tulara, *Haught 40*. Cerro Prieto, *Haught 191*. Amotape Hills, *Haught 37*.—Amazonas(?): Marañón Valley, *Weberbauer 6214;* 155.—Cajamarca: Jaén de Bracamoras, *Bonpland* (type, *R. tripartita*). To Brazil and Florida.

9. GOSSYPIUM L.

Reference: Hutchinson, Silow & Stephens, Evolution of Gossypium, i-xi, 1–160. 1947.

Tall herbs or shrubby, sometimes arborescent, more or less dotted with black oil glands, the leaves usually palmately 3–9-lobed to entire, the large flowers involucrate by 3 usually ample rarely minute or caducous entire to incised bracts. Calyx cupulate, truncate or shortly 5-dentate. Stamens many, united below. Ovary cells 3–5, many-ovuled; style apically clavate, 5-sulcate and 5-stigmatose. Capsules loculicidal, the seeds sub-globose or angled, almost glabrous to (ordinarily) more or less densely lanate.—Besides the above well-presented and informative book entitled "The Evolution of Gossypium and the Differentation of the Cultivated Cottons," see Guy Roberty's conscientious work, Candollea 7: 297–360. 1938; also 10: 345–398. 1946.

Cotton in Peru is of such interest that the reference work cited (Oxford University Press) may be recommended here especially to those concerned with cotton as a crop, for the book contains an extensive bibliography and basic information of agricultural as well as botanical significance.

The domestication of cotton and its association with man's development is also presented, graphically, under the general consideration of the evolution of the various species, and interesting accounts of the cottons of both the New and the Old World.

Peruvian publications of the Est. Expl. Agric. de La Molina (Peru) concerning the cultivation of cotton include: Insects of cotton, J. F. Wille & O. Beingolea, Informe 88. 1954; Fungus of cotton, "Damping Off," by José M. Lamas & Consuelo Bazán de Segura, 89; Control of cotton insects by use of maiz between rows and insecticides, by Juan E. Simon F., 90; Insectos e insectidas en la

compaña algodonera, by Juan E. Wille, Juan E. Simon, Juan E. Gonsalez, 97. 1955; also, 25th Memorial Anual (1952) of cultivated cotton within Peru.

Nine (or ten) of the fifteen known native species, all without true lint hairs, are endemic to the western side of the Americas and adjacent islands; five cultivated species are recognized, all with lint hairs, but many forms of these have been described as wild or semi-wild, probably however persisting from abandoned plantations.

Leaves deeply lobed; bractlets coarsely laciniate.....*G. barbadense.*
Leaves entire; bractlets finely laciniate.....*G. Raimondii.*

Gossypium barbadense L. Sp. Pl. 693. 1753. *G. peruvianum* Cav. Diss. 6: 313. *pl. 168.* 1788. *G. vitifolium* Lam. Encycl. 2: 135. 1786. *G. barbadense* L., subsp. *vitifolium* (Lam.) Roberty, Candollea 10: 386. 1946.

Shrub or annual, glabrous or pubescent with long trichomes; fruiting branches many-jointed; leaf-lobes 3–5, somewhat constricted at base, rather long-acuminate, often plicate at the sinuses; bractlets about as wide as long, with usually 10–15 narrowly lanceolate-acuminate teeth commonly exceeded by the subtubular corolla, not much expanding; stamen tube long, the anthers evenly and closely disposed; stigmas never spreading, often connate; carpels ordinarily 3.5–6 cm. long, 3–(4)-celled, ovoid, acute, glandular punctate, the sutures glabrous; seeds usually 5–8 per cell, with (in cultivation) abundant even lint, sometimes also more or less tomentulose.—A wild type with sparse lint was found and recorded by Boza.

Inca cultivations of this species gave place to those of Indian tribes and from these a commercial crop has been re-established in the coastal valleys of Peru, the dominant variety, Tanguis, being perennial, wilt-resistant; but the modern trend is in favor of annual cottons (after Boza, as given by Hutchinson, et al., l.c. 102). Egyptian cotton of commerce may be annual varieties descended from hybrids of Sea Island with *G. barbadense.* Roberty in his revision, Candollea, l.c. considers *G. peruvianum* as a species which may be useful in some types of investigations.

Tumbez: (*Boza*).—Piura: (fide Boza & Madoo).—Cajamarca: Pacasmayo, *Rose 18516* (det. Cook).—San Martín: Tarapoto,

Williams 5764.—Ayacucho: Thickets, Aína, *Killip & Smith 22843.* —Junín: Thickets, La Merced, *Killip & Smith 23562.* San Ramón, *Killip & Smith 24884.* Río Pinedo, *Killip & Smith 23643.*—Cuzco: Valle de Lares, Hacienda Pabellón, *Herrera 789.* Valle de Santa Ana, *Cook & Gilbert 1499.* San Miguel, *Cook & Gilbert 1023.*— Loreto: Clearing, Puerto Arturo, *Killip & Smith 27864.* Cliff edge, La Victoria, *Williams 3103.* Lower Río Nanay, *Williams 351; 444.* Yurimaguas, *Killip & Smith 28044.* Northwestern Argentina and northwards in tropical America. "Algodón," "utju," "ampi" (Campa), "uchto" (Cook and Gilbert).

Gossypium Raimondii Ulbr. Notizbl. Bot. Gart. Berlin 11: 548. 1932. *G. Klotzschianum* Anderss. subsp. *Raimondii* (Ulbr.) Roberty, Candollea 13: 29. 1950.

Branches terete or subangled, the younger as the promptly caducous subulate stipules, these 6 mm. long, grayish-tomentose; petioles erect, 3–5 cm. long, densely and softly tomentose as the truncate or subcordate based acute or subacuminate entire leaves beneath, these glabrescent in age above except the 5–7 prominent nerves, 8–14 cm. long, 9–12 cm. wide; involucral bracts semi-orbicular, nearly 3 cm. long, 1.5–2 cm. wide with subulate-linear lacinulae to 2 cm. long, tomentose as the campanulate calyx; corolla 15–16 mm. across, the obcordate-cuneate petals especially toward the base sparsely tomentose, glabrous within with more punctiform glands, dark purple toward the base as the conical stamen tube, this 1 cm. long, filaments long, the upper longer than those below; capsules acuminate, the sutures with a line of trichomes between the 2 rows of seeds, these 4–8 per cell, densely pubescent with greenish trichomes.—Apparently related to *G. Klotzschianum* Anderss. of the Galapagos with glabrous branches and less tomentose more or less 3-lobed leaves, larger involucres, smaller flowers; and the glands present on calyces and leaves of *G. peruvianum* Cav. are here present only on the petals (Ulbrich). See Boza & Madoo, Est. Exp. Agric. Molina, Peru, Bol. 22. 1941, for a study of this species and excellent illustrations. Roberty's disposition may be correct or logical but for this work it is useful to consider the Peruvian plant as a distinct species.

Cajamarca: Ascope to Cascas, *Raimondi 326*, type. Playa del Río de Santa Ana o Jaguey, *Raimondi.* Near Cascas, *Raimondi.*— Libertad: Near dry stream bed among *Prosopis* trees, Hacienda Chiclín, *West 8081* (det. Kearney).

10. MALVA Linn.

Annual or biennial, usually somewhat hirsute, often procumbent or erect-ascending herbs, the leaves frequently angulately lobed or dissected, the flowers solitary or fasciculate in the axils, sessile or peduncled, rarely borne in terminal racemes. Bractlets 3, distinct. Calyx 5-parted, at least medially. Petals emarginate, rarely denticulate. Anthers clustered at the top of the filament tube. Ovary cells many, 1-ovuled, the ovule erect or ascending. Style branches 7 or more, stigmatic longitudinally within. Fruit circular, more or less flattened, the many erostrate indehiscent uniseriate carpels parting at maturity, the seed ascending.

Flowers pedicelled ..... *M. parviflora.*
Flowers sessile or subsessile ..... *M. verticillata.*

Malva parviflora L. Amoen. Acad. 3: 416. 1756.

Erect divaricate-branched annual or biennial, a dm. to sometimes 2 meters high, glabrous or sparsely stellate pubescent; leaves cordate-suborbicular, shallowly 5–7-lobed, dentate-crenate; pedicels 2–10 mm. long, usually clustered in the axils, slender; bractlets linear-lanceolate, 3–5 mm. long, the pubescent calyx 4–6 mm. long at anthesis but spreading in fruit to form a rotate-scarious disk 12–16 mm. wide, the lobes deltoid-ovate; petals obovate, emarginate, 4–6 mm. long, glabrous, white except for purplish tips and veins; carpels 8–12, dorsally reticulate, dentate in angles, puberulent as the seed.—The "Cheeses" or "Cheese-weed" of English-speaking children. The similar *M. rotundifolia* L. is a much branched procumbent weed with mostly solitary flowers, villous petal-claws, reticulate acutely margined carpels, while the simulating *M. neglecta* Wallr. has smooth rounded carpels. Another weed-like species to be expected is *M. nicaeensis* All. marked by ovate bractlets.

Cuzco: Hacienda Macju, Pampa de Anta (*Herrera 652*). "Malva sylvestre." Almost cosmopolitan.

Malva verticillata L. Sp. Pl. 689. 1753.

Erect, branching, glabrous or pubescent, petioles elongate, about as long as the leaves, these cordate-suborbicular, 5–6-lobate, 2.5–7 (12) cm. long; flowers subsessile, densely verticillate; bractlets linear-lanceolate, 6 mm. long; calyx lobes ovate, acute, about 8 mm. long but accrescent; petals 6–12 mm. long; carpels 10–12, trans-

versely rugose dorsally, reticulate laterally.—Apparently like *M. parviflora* except for the densely clustered flowers.

Leaves used as a poultice (Mexia).

Huánuco: Chinchao, 2,200 meters, *Mexia 04150* (det. Johnston). "Malva crespa" (Mexia). Widely distributed.

11. WISSADULA Medic.

Reference: R. E. Fries, Sv. Vet. Akad. Handl. ser. 2, 43, no. 4: 1–114. 1908.

Like *Abutilon* but carpels more or less completely divided by horizontal or oblique constriction of lateral walls; flowers, at least in Peru, about half a cm. long except *W. disperma* (1 cm.) and *W. stellata* (1–2 cm.).

Leaves obviously and unevenly dentate or repand-dentate; petals about 8 mm. long or longer unless *W. Pavonii*.
  Carpels muticous; pedicels short.....*W. Pavonii*.
  Carpels aristate; pedicels 2 (–4 in fruit) cm. long....*W. disperma*.
Leaves entire or finely and evenly, often obscurely crenulate-serrulate or -repand; petals shorter than 8 mm. except *W. stellata*.
  Corolla 8–10 mm. long or longer, yellow; leaves velvety both sides. *W. stellata*.
  Corolla 3–5 (7) mm. long; leaves various.
    Flowers yellow or brownish-red, sometimes light yellow.
      Leaves velvety both sides unless rarely in age, cordate.
        Leaves unless uppermost at least obscurely or remotely crenate-serrulate.....*W. fuscorosea*.
      Leaves all entire.
        Carpels soon longer than calyx.
          Peduncles and calyces setose-stellate and tomentose. *W. subpeltata*.
          Peduncles and calyces puberulent...*W. hernandioides*.
        Carpels not or barely exceeding calyx....*W. microcarpa*.
      Leaves except nerves soon glabrous or subglabrous above, rounded or little cordate at base.....*W. excelsior*.
    Flowers white or purplish.....*W. zeylanica*.

Wissadula disperma Hochr. Ann. Cons. Jard. Bot. Genève 20: 114. 1917. *Pseudabutilon Hitchcockii* Ulbr. Notizbl. Bot. Gart. Berlin 11: 522. 1932?

Glandular-villous, especially the cylindrical somewhat zigzag stems, petioles, these 2–6 cm. long or longer, peduncles (to 2 cm. or 4 in fruit, medially articulate), calyces without, and obconic fruits; stipules subulate, to 6 mm. long; leaves broadly ovate, deeply cordate, abruptly and acutely acuminate (acumen to 2 cm. long), unevenly and coarsely dentate or sinuate-dentate, often 5–8 cm. long, 1.5–3 cm. wide, velvety both sides, densely villous-tomentose beneath, less so and slightly glandular above, palmately 9-nerved at base; leaves reduced above; calyx cupulate, glabrous toward base within the nectary conspicuous, the lobes elongate, 8 mm. long, fruiting calyx nearly 1.5 cm. long; petals about 1 cm. long, basally pilose on margins; stamen column 2.5 mm. long, glabrous basally, densely pilose above; carpels 5, bicorniculate, 8–9 mm. long without beaks these about 3 mm. long, the transverse fold little developed, with 2 superposed lenticular pilose seeds, the upper erect, the lower pendent.—Very remarkable in that it constitutes an obvious connection between *Wissadula* and *Abutilon* (author). Here would be sought the apparently similar *Pseudabutilon Hitchcockii* Ulbr. Notizbl. Bot. Gart. Berlin 11: 522. 1932 of Guayaquil "which seems to be very well attributed by you to *W. disperma* but I have not seen the plant of Hitchcock" (B.P.G.H.). F.M. Neg. 23755.

Peru(?): without data, *Pavón*, type.

Wissadula excelsior (Cav.) Presl, Rel. Haenk. 2: 118. 1835; 44. *Sida excelsior* Cav. Diss. 1: 27, *pl. 5.* 1785. *Abutilon ferrugineum* HBK. Nov. Gen. & Sp. 5: 271. 1822?

Virgate, little branched, sometimes a meter tall, the terete upper stems, petioles, leaf nerves beneath and younger panicles notably ferrugineous with a partly stipitate-stellate indument; leaves entire, ovate, rounded or lightly cordate at base, acuminate, soon green and glabrescent or glabrous above, canescent between the nerves and reticulate veins beneath, often 6–12 cm. long, about half as wide; panicles rather oblong-ovoid, the peduncles to 1 cm. long or much shorter; calyx ovate at base, puberulent and rusty hirsute, 2.5–3.5 mm. long; petals yellowish, 3.5–4 mm. long; carpels 5, maturing dark, membranous, fragile, puberulent, about 8 mm. long, the beak 0.5–1 mm. long; seeds pulverulent, hilum sparsely pilose, 2 mm. long.—Fries has discussed the identity of *A. ferrugineum*, l.c. 92–93; however, it is from Yoja, Ecuador, and a later name. The native name "Palo de Balsas" noted by Cavanilles was probably a mistake. Determinations by Standley. F.M. Negs. 29799 (Jussieu); 32628 (Poeppig).

San Martín: Juanjuí, *Klug 4387*.—Junín: Near Perené Bridge, *Killip & Smith 25343*. Río Marañón Valley, *Dennis 29127* (det. Killip).—Huánuco: Tingo María (*Asplund 12067; 12311*, det. Fries). Zepelacio, *Klug 3647*. Yurimaguas, *Poeppig 2447; Williams 3914*. Mouth of the Ucayali, *Tessmann 3090*. Without locality, *Jos. de Jussieu*, type. Ecuador; Brazil.

Wissadula fuscorosea Ulbr. Bot. Jahrb. 54: Beibl. 117: 59. 1916.

Tomentose or more or less lanate-tomentose including the ample paniculate inflorescence of brownish-red flowers; stipules lanceolate, 7 mm. long; petioles subequaling the leaf-blades; lower leaves about orbicular, deeply cordate, more or less acuminate, to 10 cm. long, 6–7 cm. wide, the upper ovate to lanceolate, obscurely or distinctly serrate, the 7–9 palmate nerves and reticulate veins prominent beneath; pedicels 1–2 mm. long, to 5 mm. after anthesis; calyx glabrous within, 4.5 mm. long, the ovate acuminate lobes 2 mm. long; corolla spreading, 6 mm. long, connate 1 mm. with stamen tube, this subconoid, glabrous; styles 3–4 mm. long, with a few scattered trichomes, stigmas globose, glabrous; fruits obconoid-globose, the calyx broken to base, to 6 mm. high, the 4 tomentulose apiculate carpels 2–3-seeded, the seeds in the upper cell mostly collaterally binate, one in the lower cavity, densely lanate near the hilum.—To 2 meters high. Resembles *W. contracta* (Link) R. E. Fries and *W. densiflora* R. E. Fries, both with shorter pedicelled yellow flowers. F.M. Neg. 9299.

Huancavelica: Grasslands, Prov. Tayacaja, left of Río San Bernardo, *Weberbauer 6556*, type.

Wissadula hernandioides (L'Hér.) Garcke, Zeitschr. Naturw. Halle 63: 122. 1890; 48. *W. amplissima* R. E. Fr., Sv. Vet. Akad. ser. 2. 43, no. 4: 48. 1908, excl. syn., fide Fawcett & Rendle, Fl. Jam. 5: 95. 1926. *Sida hernandioides* L'Hér. Stirp. 2: 121.

Branchlets, petioles and peduncles minutely stellate-tomentose or finally glabrate as the leaves above or these more or less densely and permanently canescent tomentose at least beneath, typically deeply and narrowly cordate at base or apparently sometimes openly cordate, entire or essentially, rotund-ovate or very broadly ovate, sometimes rather abruptly but in general gradually acuminate, variable as related species in size and length of petioles; flowers axillary or mostly in diffuse terminal panicles, the peduncles slender, soon 2–3 cm. long or longer, merely puberulent as the calyx, this

3–4 mm. long; corolla yellow, 4–6 mm. long, the spathulate petals ciliolate at base; fruits 8–10 mm. in diameter, at maturity only sparsely puberulent, the 4–5 carpels 7–8 mm. long, acuminate or beaked, the beak 0.5–1.5 mm. long; seeds 3, subsimilar or diverse, the upper globose-cordiform, punctate, minutely puberulent, the lower subovoid, pilose especially at the hilum.—Probably in Peru and quite possibly the specimens referred to the similar *W. subpeltata* should rather be included here. Illustrated, Fries, l.c. *pl. 4, fig. 1* (plant); *pl. 6, figs. 12–14* (fruits).

Peru (probably). Tropical America; Africa.

Wissadula microcarpa R. E. Fr., Sv. Vet. Akad. Handl. ser. 2. 43, no. 4: 55. 1908.

Younger parts densely canescent with stellate-tomentose indument, this shorter on the leaves, these greenish above in age, paler beneath, rotund-ovate, entire, deeply cordate, acuminate, to 7.5 cm. long, about 6 cm. wide or the lower probably larger, the nerves and reticulation prominent beneath; petioles (except those of the upper reduced leaves) 3.5–4 cm. long; inflorescence terminal, many-flowered, ample, the branches spreading, the puberulent peduncles 5–12 mm. long; calyx tomentulose and with some larger yellowish stellate trichomes, 3.5–4 mm. long, the ovate-triangular acute lobes 2–2.5 mm. wide; corolla lemon yellow, about 6 mm. long, the petals pilose at base as the very short stamen tube; fruit subglobose, the 5 puberulent carpels included in the calyx, acute or apiculate but not rostrate; seeds 3, similar, black, subreniform, sparsely hirsute, to 2 mm. long.—Illustrated, Fries, l.c. *pl. 6, figs. 15, 16* (fruit). F.M. Neg. 9302.

Loreto: Salinas de Tilluana on the Huallaga, *Ule 6710*, type.—Huánuco: Chulque, 1,700 meters, *Mexia 04107* (det. Johnston). "Utquicha" (Mexia).

Wissadula Pavonii Hochr. Ann. Cons. Jard. Bot. Genève 20: 113. 1917.

Younger stems irregularly angled, densely tomentose-hirsute as the petioles, these 1.5–4 cm. long, peduncles (1–2 cm.) and calyces without; leaves broadly ovate, deeply cordate at base, acute or subacuminate, about 5 cm. long, 3 cm. wide, stellate-pilose but green above, velvety ashy-tomentose below and unevenly and rather coarsely dentate, the 7–9 palmate nerves prominent beneath;

flowers solitary, axillary and crowded at ends of secondary branchlets; calyx 4, in fruit 5 mm. long, the ovate lobes glabrous within except tips; petals high-connate with short pilose stamen column, the free part about 6 mm. long, the shorter stamens sparsely pilose; fruit subglobose, about 8 mm. in diameter, the 5 subreniform muticous carpels tomentulose, about 5 mm. high, 3 mm. broad, with 2 upper collateral, 1 lower seed, all brown-black, softly pilose.—Allied to *W. decora* Sp. Moore and *W. sordida* Hochr. but distinguishable from both by the indument and by the tendency of some leaves to be trilobate by the presence of 2 slightly larger teeth (author). Here might be sought *W. andina* Britton, Bull. Torrey Club 16: 153. 1889; 76, Bolivian, with corolla 10–12 mm. long and only 3 or 4 carpels. According to Fries, *Mathews 504* from Cuesta de Purrochuco does not belong to *W. andina* as indicated by Baker; the collection has not been seen. F.M. Neg. 23758.

Lima: Chancay, (*Ruiz &*) *Pavón*, type.

Wissadula stellata (Cav.) Schum. in Mart. Fl. Bras. 12, pt. 3: 445. 1891. *W. nudiflora* (L'Hér.) Benth. Bot. Voy. Sulphur 69. 1844; 65. *Sida nudiflora* L'Hér. Stirp. Nov. 123, *pls. 59, 59b.* 1789. *Abutilon nudiflorum* (L'Hér.) Sweet, Hort. Brit. ed. 1. 53. 1827; ed. 2. 64. 1830. *Sida stellata* Cav. Diss. 1: 27. 1785.

Velvety yellowish stellate-tomentose to the pedicels, these as calyces rusty stellulate-puberulent, the former 5–13 mm. long, the latter in terminal lax subsimple or sparsely branched leafless panicles, 4–5 mm. long the broadly ovate acute lobes half as long; stipules linear-filiform; petioles 2–7 cm. long; leaves broadly ovate or the upper almost suborbicular but gradually acuminate, openly but not widely cordate at base, entire or obscurely crenulate, prominently nerved and somewhat reticulate beneath, greenish and impressed reticulate above in age, commonly 5–10 cm. long, 3.5–6 cm. wide or larger; corolla 1–2 cm. long, the spathulate-orbicular petals more or less stellate-hirsute basally, as often the 1 mm. long stamen tube; carpels 5, acute, puberulent, 5 mm. long, the upper seed slightly, lower densely, especially hilum, stellulate.—A 1–2 meter shrub. F.M. Negs. 9303; 7987 (as *Sida periplocifolia*, var., ined.).

San Martín: Juanjuí, *Klug 4330* (det. Standley).—Huánuco: Common near Huánuco, *2042; Sawada P64* (det. Ulbrich, *W. microcarpa*); *Ruiz & Pavón; Dombey*, type; *Stork & Horton 9406* (det. Standley, *W. periplocifolia*).

Wissadula subpeltata (Ktze.) R. E. Fr. Sv. Vet. Akad. Handl. ser. 2. 43, no. 4: 56. 1908. *Abutilon amplissimum* (L.) Ktze. var. *subpeltata* Ktze. Rev. Gen. 3, pt. 2: 17. 1898.

Canescent puberulent-tomentose especially the leaves beneath, their upper surfaces greenish-sericeous; stipules linear-lanceolate; petioles to 1.5 cm. long; leaves broadly ovate the uppermost almost suborbicular but gradually acuminate, deeply and narrowly cordate the basal lobes often overlapping, prominently nervose and reticulate beneath, entire, various as all species in size, those of the flowering branches often only a few cm. wide, the lower to 1.5 dm. long and wide; panicles ample with slender spreading branches; peduncles puberulent and as calyces (3.5 mm. long) early at least with a few simple and stellate rigid trichomes, 2–4 cm. long in fruit; petals cuneate, pilose below as stamen tube, about 5 mm. long; fruit subglobose, dark brown or blackish, about 8 mm. wide, the 5 carpels glabrous obovoid, 7 mm. long, beak 0.5 mm. long; seeds 3, globose-reniform, the upper strongly rugose, glabrous, the lower hirsute especially at the hilum.—Characters of pubescence and seeds not developed as indicated but apparently determinations correct. However, the older specimens of Cook and Gilbert with coarser trichomes nearly lacking seem very much like *W. hernandioides*, which compare, and perhaps would better be placed there or in *W. boliviana* R. E. Fr., 40, with openly cordate leaves, 4 carpels (always only 4?); these forms seem to crowd each other and their stability may be open to question. Illustrated, Fries, l.c. *pls. 5* (plant); *6, fig. 27* (fruit); *7, fig. 15* (androecium).

San Martín: Tarapoto, *Williams 5806* (det. Ulbrich).—Cuzco: Santa Ana, *Cook & Gilbert 1509?* To eastern Brazil and Argentina.

Wissadula zeylanica Medic. Malv. 25. 1787; 32. *Sida periplocifolia* Presl, Rel. Haenk. 2: 117. 1835, not L. as to herb.

Younger parts more or less brownish tomentulose and stellate pubescent, the leaves especially so beneath, sometimes glabrescent above, membranous or firmer, ovate- or lanceolate-triangular, gradually acuminate, truncate or openly cordate, entire, the largest lower to a dm. long or longer, nearly half as wide, reduced upwards, the petioles too becoming much shorter, even the lowest at most 3 cm. long; inflorescence (Peru) terminal, lax, more or less ample, the slender pedicels in fruit to 5 cm. long, often a few flowers solitary in the upper axils; calyx 2–3 mm. long, pulverulent or glabrous, the ovate acute lobes half as long; petals about 5 mm. long, white or violet-tinted; fruit 8–10, the pulverulent carpels (5) 7–8 mm. long,

with beak 0.5–1 mm. long; upper 2 seeds subglabrous the lower one densely hirsute especially the hilum.—The South American form, designated *W. periplocifolia* Presl var. *gracillima* R. E. Fr., l.c., 34, has a tendency to more cordate lower leaves, glabrate above, more ample panicles and carpel beaks to 1 mm. long. Still more distinct is *W. diffusa* R. E. Fr., l.c., 37, from near Guayaquil, the carpel beaks 2–3 mm. long, but scarcely, as the author suggests, more than a variety. Distinct but similar and occurring within Peru is *W. hernandioides* (L'Hér.) Garcke (*W. amplissima* R. E. Fries, l.c., 48, fide Fawcett & Rendle); the leaves are narrowly and deeply cordate at base, the smaller petals yellow.

Junín: Cabello, river canyon, *1330* (det. Hochreutiner). Puerto Yessup, stream bed, *Killip & Smith 26316* (det. Standley). Ceylon; Africa; tropical America.

12. PSEUDABUTILON R. E. Fries

Reference: Fries, Sv. Vet. Akad. Handl. ser. 2. 43, no. 4: 96–108. 1908.

Like *Wissadula* but the carpels more or less divided by the horizontal projection of the dorsal wall, that is, the two cavities are separated by an endoglossum, a membranous tongue-like organ, instead of by a horizontal fold formed by constriction of the lateral walls.—The carpels are 5–11 and the flowers at least in Peru to about 8 mm. long. In *Wissadula* the endoglossum is developed in varying degrees, an impression gained particularly from Kearney's interpretation, Amer. Midl. Nat. 46: 115. 1951, but Hochreutiner has called to my attention his belief that the character is important; however, it is characteristic also for *Modiola*, belonging to a different generic alliance, and therefore may not be a significant indicator of generic relationship.

Leaves ovate, long-acuminate or acute.

Petals about 8 mm. long; leaves as calyx black punctate. *P. nigripunctulatum.*

Petals about 5 mm. long; leaves not black punctate. *P. Weberbaueri.*

Leaves suborbicular, abruptly acuminate..... *P. spicatum.*

Pseudabutilon nigripunctulatum (Ulbr.) R. E. Fries, Sv. Vet. Akad. Handl. ser. 3. 24, no. 2: 11. 1947. *Abutilon nigripunctulatum* Ulbr. Bot. Jahrb. 54, Beibl. 117: 57. 1916.

Branchlet tips and cordate-ovate leaves especially beneath black puncticulate and also more or less scabrous with minute stellate trichomes, the filiform stipules (3–4 mm. long), petioles (5–20 mm. long) and calyces without somewhat tomentose; leaves rather long-acuminate, 3–5 cm. long, 1.5–3 cm. wide, crenate-serrate, yellowish-green and black punctulate beneath, the nerves prominent; flowers white, axillary or in the axils of a highly varied inflorescence, the slender peduncles 2–3 cm. long, articulate about 3 mm. below the calyx, this cupulate, 5 mm. long, the tomentose lobes 2 mm. long, black punctulate at base, glabrous within; petals suborbicular, glabrous, 8 mm. long; stamen tube 4–5 mm. long, conoid at base; styles 3 mm. long, connate 1 mm., the capituliform stigmas globose; carpels 6, grayish subtomentose, shortly aristate, not splitting apart, the 2–3 seeds tomentulose near the hilum. —Fries, l.c., noted that the species has the endoglossum of *Pseudabutilon*. Shrub about a meter high with an aromatic fragrance. F.M. Neg. 9281.

Lima: San Bartolomé, 1,500 meters, *Weberbauer 5301*, type. —Apurímac: Río Pachachuca, *Goodspeed Exped. 10524* (det. Standley).

Pseudabutilon spicatum (HBK.) R. E. Fries, Sv. Vet. Akad. Handl. ser. 2. 43, no. 4: 98. 1908. *Wissadula spicata* (HBK.) Presl, Rel. Haenk. 2: 117. 1835. *Abutilon spicatum* HBK. Nov. Gen. & Sp. 5: 271. 1822.

More or less suffrutescent, often a meter or so high, canescent tomentose but the leaves green above at maturity, the older stems glabrescent; stipules tardily deciduous, linear-subulate, to 1 cm. long; petioles 5–15 cm. long, but upper leaves often subsessile; leaves suborbicular, deeply cordate, abruptly acuminate, 5–15 cm. long, about as wide, or larger, dentate, the 7–9 primary nerves most marked beneath; panicles to 4 dm. long, leafless, with short appressed subspicate branchlets, the fruiting peduncles about 3 mm. long; calyx 3–4 mm. long, lobes acute; petals retuse, glabrous except basal margins, 6–7 mm. long; fruit 5-merous, turbinate, 7–8 mm. in diameter, the carpels stellate-pilose, acute, 4–5 mm. long; seeds globose-cordiform, puberulent except glabrous hilum, scarcely 2 mm. long and broad, 2 collateral in upper cavity, 1 in lower.—Illustrated, Mart. Fl. Bras. 12, pt. 3: *pl. 78;* Fries, l.c., *pl. 7* (carpel).

San Martín: Juanjuí, *Klug 4245* (det. Standley). Tarapoto, *Williams 6097* (det. Ulbrich).—Junín: Colonia Perené, *Killip &*

Smith 25006 (det. Ulbrich). Bolivia to Mexico and the West Indies.

Pseudabutilon Weberbaueri Ulbr. Bot. Jahrb. 54: Beibl. 117: 60. 1916.

Yellowish tomentose, even the axillary subpaniculate inflorescences; stipules linear-lanceolate, 2 mm. long; petioles angulate, 1.5–3 cm. long; leaves ovate, deeply cordate, acute, 4–8 cm. long, 3.5–5 cm. wide, crenulate-serrate, the 7–8 nerves and reticulate veins prominent beneath; pedicels 3–8 mm. long, articulate 2–3 mm. below the calyx, this cupulate, 3 mm. long, the broadly ovate acuminate lobes 2 mm. long; corolla yellow, spreading, the 10-nerved oval obtuse petals 4.5–5 mm. long, nearly 1 mm. connate with the stamen tube, this stellate above; styles with capitate stigmas glabrous, free; fruits cylindric-globose, calyx more or less reflexed, 5 mm. high, with usually 8 compressed ovoid carpels, nearly divided dorsally below the middle, each cavity with 1 cordiform seed, its sparse indument simple, and stellulate trichomes.—Type 2 meters high among shrubs and small trees. Belongs in the neighborhood of *W. paniculata* Rose with 6–11 carpels.

Cajamarca: Shumba Valley, 700 meters, *Weberbauer 6169*, type.

13. ABUTILON Adans.

Gayoides (Gray) Small, Fl. S. E. U. S. 764, 1335. 1903. *Bogenhardia* Rohb. Repert. Gen. Pl. 1: 200. 1841.

Reference: Schumann, Mart. Fl. Bras. 12, pt. 3: 253–456. 1891; and Pflanzenfam., Nachtrag 1: 235–239. 1897.

Herbs or shrubs generally with somewhat cordate angled or lobed leaves and mostly axillary often showy flowers. Involucel wanting. Ovary cells 5-many, normally 2–9-ovuled (cf. *A. pulverulentum*, *A. Weberbaueri*); ovules erect-ascending except 1-ovuled species. Styles filiform or clavate, stigmatose apically. Carpels slightly to much inflated if at all usually acute and mucronate to aristate, the walls thin, firm-membranous or coriaceous, various in dehiscence but always primarily loculicidal sometimes early septicidal; in most species the carpel halves fall as units or when they remain attached it is the halves of adjacent carpels that form the pair (Hochreutiner, Ann. Cons. Jard. Bot. Genève 21: 364–365. 1920).—The 1-ovuled species as noted may be referable to *Sida* or *Bastardia* (Kearney, in herb.). However the same variation has

been accepted for *Wissadula*. Maybe these questionable species are connecting entities in this remarkably close-knit family and are most conveniently placed in the genus in which their general facies seems least out of place. *A. dianthum* Presl, accredited in litt. to Peru, came from Ecuador. Svenson, Amer. Journ. Bot. 33: 463. 1946, following Fawcett & Rendle retained the single species of *Gayoides* in *Abutilon* a procedure that has been emphatically endorsed by Hochreutiner who has observed to me: it is distinguishable only by the consistency of the carpel wall which is very variable in the genus.

Flowers large, normally (full-grown) 3–4 cm. long.
  Petals soon spreading, finally reflexing, narrow.
    Leaves softly tomentose on both sides; stems short-stellate. *A. reflexum.*
    Leaves soon scabrous-stellate or glabrous above; stems pilose or hirsute.
      Leaves coarsely crenate; peduncles to 7 cm. long. *A. lateritium.*
      Leaves subentire; peduncles to 2 dm. long . . . *A. pedunculare.*
  Petals erect or tardily spreading above, broad.
    Leaves distinctly lobed . . . . . *A. striatum.*
    Leaves not lobed.
      Indument of broadly ovate or subrotund leaves velvety on both sides.
        Peduncles longer than subtending leaves . . . . . *A. longipes.*
        Peduncles shorter than subtending leaves . . . . *A. arboreum.*
      Indument of triangular-ovate leaves scabrous above, soon sparse or lacking . . . . . *A. sylvaticum.*
Flowers rarely little longer than 2 cm., usually shorter.
  Indument of branchlets in part spreading, pilose-hirsute; flowers mostly or all solitary.
    Flowers yellow; carpels 1–3-ovulate or -seeded.
      Petals erect.
        Indument in part viscid-glandular.
          Carpels muticous or nearly, 3-seeded; leaves acute or obtuse . . . . . *A. hirtum.*
          Carpels rostrate, 1–2-seeded; leaves shortly acuminate. *A. Weberbaueri, A. cordatum.*

Indument neither viscid nor glandular.

Carpel walls firm; petals 1.5 cm. long or longer.

Calyx-lobes acute; carpels muticous or nearly, ovules as seeds 3 ..... *A. indicum.*

Calyx-lobes acuminate; carpels cusped, ovules as seeds about 4 ..... *A. mollissimum.*

Carpel walls thin, finally much inflated; petals to 12 mm. long ..... *A. crispum.*

Petals soon reflexed ..... *A. giganteum.*

Flowers not yellow; carpels 6–8-ovuled ..... *A. pauciflorum.*

Indument of branchlets stellate-puberulent to lanate, often minute or lacking, or flowers mostly not solitary.

Flowers not yellow, solitary except *A. pulverulentum.*

Petals promptly reflexed; indument soon scurfy-stellate. *A. arequipense.*

Petals tardily if at all reflexed.

Flowers solitary on long slender pedicels ..... *A. piurense.*

Flowers glomerate in efoliate cymes. *A. pulverulentum, A. cymosum.*

Flowers yellow, in several-flowered inflorescences unless the lowest, paniculate or in axils.

Branchlets lanate or velvety-tomentose.

Flowers paniculate ..... *A. ramiflorum.*

Flowers in crowded cymes ..... *A. cymosum.*

Branchlets scabrous stellate or glabrate, or also somewhat villous.

Petals not reflexing.

Flowers mostly in several-flowered inflorescences; carpels 5–7 (11) ..... *A. umbellatum.*

Flowers mostly axillary-clustered; carpels 8–9. *A. virgatum.*

Petals reflexing after anthesis; uppermost flowering branchlets somewhat panicled ..... *A. giganteum.*

Abutilon arboreum (L.) Sweet, Hort. Brit., ed. 1: 53. 1827. *Sida arborea* L.f. Suppl. 307. 1781. *S. peruviana* Juss. ex Cav. Diss. 1: 36. 1785. *S. grandiflora* Poir., Encycl. Suppl. 1: 31. 1810. *S. mollis* Ortega, Decad. 5: 65. 1798, at least as to Peru.

Shrub or small tree, sometimes 6 meters high, the upper branches and petioles sericeous-tomentose or -puberulent, sometimes also pilose; leaves broadly ovate, deeply cordate, more or less acuminate, softly tomentose both sides, usually about 1.5 dm. long and nearly as wide, or the lower twice as large, the petioles about as long; stipules subulate, acuminate, 1 cm. long or longer, tardily caducous; peduncles commonly 1 dm. long or twice as long in fruit, sometimes binate, always axillary, but frequently on an accessory branchlet; calyx campanulate, canescent-sericeous, 1.5–2 cm. long, the oblong triangular acute 3-nerved lobes tomentose within and without; petals whitish, 3.5–4 cm. long, about 3 cm. wide at the retuse apex, marginally pilose on the long claw; androecium 3 cm. long, the stamens in 5 fascicles; ovary white-villous, the cells about 8-ovulate; carpels chartaceous, ultimately 1.5 cm. long, 1 cm. broad, ferrugineous-tomentose dorsally; seeds 3 mm. in diameter, glabrous except for the conspicuously villous hilum.—Synonymy after Schumann; type of *S. peruviana* by Jos. de Jussieu without locality; probably also *S. arborea*, the type locality not Africa as given by Linnaeus f. (Schumann). Vargas noted the flowers as white. For some reason most of the Peruvian collections have been referred to *A. molle* (Orteg.) Sweet. Determinations by Kearney except as noted. Illustrated, L'Héritier, Stirp. Nov., *pl. 63*.

Junín: San Ramón, *Killip & Smith 24802* (det. Ulbrich). Carpapata, *Killip & Smith 24476* (det. Killip).—Huánuco: Cuchero, *Dombey; Poeppig*.—Cuzco: Ruins of Machupicchu, *West 6424* (det. Johnston).—Apurímac: Ampay, *Vargas 783*.—Cuzco: Valle de San Miguel, *Herrera 1985; 1986*. Valle del Urubamba, *Herrera 1570; 3347*. San Miguel, *Cook & Gilbert 920*. Machupicchu, *Vargas 783; 784*. Ollantay, *Soukup 567*. Near Cuzco, *Soukup 138*. "Ratarata" (Herrera).

Abutilon arequipense Ulbr. Bot. Jahrb. 54: Beibl. 117: 49. 1916.

Younger branches and leaves densely yellowish cinereous lanate-tomentose, becoming scurfy-stellate or glabrescent, the gray bark nodulose rugulose, the leaves cordate-oblong, obtuse or subacute, 2–3 cm. long, 13–18 mm. wide; stipules linear, 8 mm. long; petioles 5–10 mm. long, short-tomentose as peduncles, these 2.5–3 cm. long, and calyces, these nearly 11 mm. long, the ovate cuspidate lobes about 8 mm. long, 6 mm. wide at base; corolla violet, soon reflexed, darker toward base within; petals suborbicular, to 13 mm. long,

15 mm. wide, about 15-nerved; stamen tube lanate, 6 mm. long, anthers globosely capitate; styles filiform, clavate, stigmas subcapitate; fruit subglobose, about 9 mm. across, carpels 9–10, oblong-ovoid, 6 mm. high, 4 mm. broad, 2.5–3 mm. thick, tomentose except laterally, the obliquely cordiform seeds fuscous-lanate.—Type a 2-meter shrub. Related to *A. cordatum* with larger cordate leaves, different pubescence on branches and petioles; styles, stigmas and carpels suggest those of *A. Seineri* Ulbr. of Africa, and it appears to me that there is a relationship; there are similar cases of alliance between plants of South Africa and the Andes; cf. Engler, Sitzungsb. Kgl. Preuss. Akad. Wiss. 20: 564. 1914 (Ulbrich).

Arequipa: Above Cotahuasi, 2,800 meters, *Weberbauer 6863*, type.

Abutilon cordatum Garcke & Schum. Mart. Fl. Bras. 12, pt. 3: 369. 1891.

Slender terete flowering branches abundantly tomentose, with stellate and simple glandular viscid trichomes above; stipules linear-subulate, hirsute, promptly caducous; petioles 5–10 cm. long; leaves cordate, rather shortly but acutely acuminate, repandly dentate, 1–1.5 dm. long, about 1 dm. wide, softly tomentose on both sides; flowers all axillary, solitary, on peduncles 2.5–3.5 cm. long, articulate above the middle, sometimes with an accessory branchlet; calyx campanulate, to 14 mm. long, the oblong triangular acuminate lobes pubescent within and without with bulbous-based trichomes and also stellate-tomentose; petals 13–15 mm. long, about 1 cm. wide above, ciliolate-pilose toward the base, apparently yellow; ovary globose villous, the cells biovulate.—Species distinct by the two-ovulate cells and the stellate, simple and glandular indument, intermixed (authors). It is really so; Baker f. made a mistake in putting it into the uniovulate *Abutilon* (B.P.G.H.).—Type from Guayaquil; in *Asplund 7667* with more obtuse leaves, the calyx shorter than the corolla, the carpels are 9–10 mm. long, beaks 2.5–3 mm. long, glabrous below, densely glandular-pubescent above, the reniform sparsely pubescent seeds about 3 mm. in diameter (Fries). F.M. Neg. 9264.

Libertad: Prov. Patáz, *Raimondi* (det. Ulbrich). Ecuador.

Abutilon crispum (L.) Medic. Malv. 29. 1787. *Gayoides crispum* (L.) Small, Fl. S.E. U.S. 764, 1335. 1903. *Sida crispa* L. Sp. Pl. 685. 1753. *Bogenhardia crispa* (L.) Kearney, Leafl. West. Bot. 7: 120. 1954.

Softly tomentose herb or half-shrub, the prostrate or sprawling to suberect stems somewhat hirsute-pilose; stipules subulate, 5–7 mm. long, more or less persisting; leaves cordate, the upper subsessile the lower long-petioled, all acute or shortly acuminate, coarsely serrate; peduncles solitary or binate in the axils, articulate above the middle; calyx about 6 mm. long, the ovate lobes acuminate, the rounded yellowish petals slightly to twice as long; fruit yellowish, the inflated carpels about 12, usually 3-ovuled, or 1-ovuled (Svenson), at maturity minutely pilose and setose, 10–15 mm. long.—Svenson, besides noting the single seeded carpels of his collections, recorded the flowers as minute, orange; however variable the species, this local variant seems worthy of recognition to call attention to it if for no other reason and may be recorded as var. **Svensonii** Macbr., var. nov., ovulis solitariis; floribus minutis intense flavibus. Illustrated, Fawcett & Rendle, Fl. Jam. 5: 99.

Piura: In shrubs along creek north of Talara, *Horton 11596*. Amotape Hills, trailing (*Haught & Svenson 11543*, type, var.).—Huánuco: Trailing, stony hill, *3165*.—Junín: Sandy valley floor, La Merced, *5453*.—Ayacucho: Aina, *Killip & Smith 22845*.—Apurímac: Río Pachachuca, prostrate-radiating in gravel, *Goodspeed Exped. 10517* (det. Standley). Abancay, *Vargas 466* (det. Standley). American and Old World tropics.

Abutilon cymosum Tr. & Pl., Ann. Sci. Nat. sér. 4. 17: 185. 1862. *A. rufinerve* Seem., Bot. Voy. Herald 83. 1853, not St. Hil.

A shrub about 2 meters high, the branches velvety with a reddish-yellow tomentum; stipules linear, erect; petioles long; leaves cordate, acutely acuminate, unequally serrate, thick, 5-nerved; cymes axillary, often geminate, the rather long erect peduncles with 1–3 small leaves at apex; flowers 5–15 or more in crowded cymes, the pedicels sometimes much longer than the calyces, these cuspidate-lobed and shorter than the erect yellow petals; carpels about 8, very acutely subulate-rostrate, finally biparted, the 3 glabrous seeds sparsely muricate-papillose.—Imperfectly known but according to Baker occurring in Bolivia and if so, no doubt in Peru.

Peru (cf. note above). To Panama.

Abutilon giganteum (Jacq.) Sweet, Hort. Brit. ed. 1: 53. 1826. *Sida gigantea* Jacq. Hort. Schoenbr. 2: 8, *pl. 141*. 1797.

Herb or shrub, the young branches and elongate petioles with or without spreading pilose indument, the large round-ovate leaves

stellately and simply pubescent above, tomentose beneath, the trichomes on the 9 prominent nerves simple; flowers solitary, axillary, accompanied by a flowering branchlet forming spreading foliose panicles; calyx about 1 cm. long, the lanceolate lobes 1-nerved within, the orange (or lilac and yellow according to Klug) petals finally reflexed, somewhat longer, villous at base about the stamen-tube; carpels 8–14, tomentose, rostrate, the 3 seeds tuberculate-pubescent.—According to R. E. Fries the species occurs in two forms as to pubescence, one lacking the spreading pilose trichomes.

San Martín: Juanjuí, *Klug 3887; 4370* (both det. Fries, det. n. sp. in herb. by Standley). West Indies; Central America; Colombia.

Abutilon hirtum (Lam.) Sweet, Hort. Brit. 1: 53. 1826. *Sida hirta* Lam. Encycl. 1: 7. 1783.

Somewhat viscid, flowering as an herb persisting as a shrub, the indument short-stellate and simple trichomes intermixed; petioles to a dm. long; leaves suborbicular, sometimes obscurely 3-lobed, cordate, sometimes obtuse, often several cm. long and nearly as wide; flowers solitary, axillary but more or less corymbose above, tawny-yellow or orange with darker base, the oblique subretuse petals 1.5–2 cm. long; calyx 13–16 mm. long, the lobes acute or acuminate; stamen tube stellate; carpels about 20, 3-seeded, early densely stellate, 10-12 mm. long, the dark brown seeds minutely pitted and stellulate, 2.5–3 mm. thick.—Tomentum of branches generally ferrugineous, the long trichomes simple and somewhat glandular; accessory axillary branchlets develop rapidly by the flowers (Hochreutiner). Treated as a variant of *A. indicum* by Grisebach, and apparently with reason.

Lima: Botanical Garden, *Killip & Smith 21521* (det. Killip). Tropical Asia and Africa; West Indies; Florida.

Abutilon indicum (L.) Sweet, Hort. Brit. 1: 54. 1826. *Sida indica* L. Cent. Pl. 2: 26. 1756; Amoen. Acad. 4: 324. 1759.

Herb or becoming suffrutescent the younger parts canescent-tomentose with usually some longer trichomes intermixed; petioles short or elongate; stipules 3–5 mm. long; leaves round-ovate to broadly ovate, cordate, acute, more or less clearly 3-lobed, irregularly crenate or serrate, often about a dm. long, finally glabrescent; peduncles solitary or often corymbose, articulate below the calyx this 1 cm. long with ovate acute lobes; petals nearly 1.5 cm. long, yellow, oblique, pubescent at base; stamen tube glabrous; carpels

12 mm. long, coarsely tomentose the 3 seeds glabrous except at hilum, pitted.—Indument canescent, short; leaves ovate, more canescent below than above; long solitary axillary peduncles usually longer than leaves; calyx ordinarily shorter than the black hirsute carpels these 15 or 16 (Hochreutiner). F.M. Neg. 23776 (var.).

Cuzco: Lucumayo Valley, *Cook & Gilbert 1394* (det. Ulbrich). Tropical Regions.

Abutilon lateritium Ulbr. Bot. Jahrb. 54: Beibl. 117: 56. 1916.

Young branches scabrous and hirsute-pilose; stipules lanceolate, 5 mm. long, tomentose as the suborbicular leaves below; petioles 3–5 cm. long, hirsute; leaf-blades deeply cordate, acute or acuminate, 5–9 cm. long, 4–8 cm. wide, irregularly and coarsely crenate-serrate, glabrescent or subscabrous above, the 7 nerves prominent; flowers subnutant, the erect axillary peduncles 5–7 cm. long, articulate 5 mm. below the calyx, this 2.5 cm. long, tomentose within and without, the lanceolate lobes to 2 cm. long; corolla red, campanulate, the obtuse petals soon reflexing, glabrous except at base, obtuse, 3.5–4 cm. long, connate 7–8 mm. with stamen tube, this conoid, to 3 cm. long, stellate only within toward base; styles many, to 1 cm. connate, glabrous as capitate stigmas; fruit subglobose, to 2.5 cm. across, the many compressed carpels 10–11 mm. high with beaks 2–3 mm. long, laterally glabrous, not connate, the 2 or 3 seeds verruculose, minutely pubescent.—Type a meter high shrub in rocks comparable to *A. reflexum* with subentire leaves, smaller flowers and fruit and different pubescence (Ulbrich).

Lima: Near Chosica, 2,000 meters, *Weberbauer 5349*, type.

Abutilon longipes Ulbr. Bot. Jahrb. 54: Beibl. 117. 52. 1916.

White velvety tomentose except leaves above, even to the calyces; petioles subequaling the broadly ovate or suborbicular deeply cordate leaves, these to 12 or 13 cm. long, acuminate, minutely dentate, tomentulose but greenish above, prominently about 7-nerved beneath; peduncles solitary, axillary, much exceeding the leaves, articulate 1–2 cm. below the campanulate calyces, these to 3 cm. long, the lobes tomentose on both sides, 3-nerved, acute; corolla campanulate, subspreading, glabrous, 3.5 cm. long, petals yellow, nearly 2 cm. wide, claw 7 mm. long; stamen tube glabrous, cylindrical; styles many, connate only at base, glabrous, the stigmas subglobose; fruit subglobose, to 3 cm. thick, the tomentose carpels

obtuse, about 18 mm. high with 3–5 finely verruculose seeds, pilose around hilum, the funicle indurate.—Related to *A. globiflorum* Don with smooth leaves and smaller flowers (Ulbrich) but seems to be very near *A. arboreum*, for which Kearney has kindly supplied the key-difference; however the character "breaks" in some material as that of Cook & Gilbert. Type 2 meters high, among other shrubs.

Ayacucho: Tambo Osno, Huanta, 2,500 meters, *Weberbauer 5599*, type. Ccarrapa, *Killip & Smith 22305* (det. Killip).—Cuzco: Marcapata Valley, near Chilechile, 2,200 meters, *Weberbauer 7875* (det. Ulbrich). Ollantaytambo, *Cook & Gilbert 274; 812* (det. Ulbrich). "Phancho," "jarul-jarul."

Abutilon mollissimum (Cav.) Sweet, Hort. Brit. 1: 53. 1826. *Sida mollissima* Cav. Diss. 2: 49. *pl. 14*. 1786. *A. calycinum* Presl, Rel. Haenk. 2: 116. 1835. *A. sordidum* Schum. in Mart. Fl. Bras. 12, pt. 3: 406. 1891. *S. cistiflora* L'Hér. Stirp. Nov. 127, *pl. 61*. 1789.

Erect shrubs, the flowering branchlets abundantly pilose with long (to 4 mm.) trichomes and some minute stellate ones intermixed; petioles 5–10 cm. long, the promptly caducous subulate stipules shorter; leaves ovate, sometimes sublobate, cordate at base, acuminate, more or less densely stellate-tomentose on both sides and with scattered simple trichomes above, crenate, often 8–15 cm. long, 6–12 cm. wide; inflorescence axillary, few-flowered (mostly 3-flowered), peduncles 4–5 cm. long; bractlets simulating stipules; calyx campanulate, plicate-angulate, the acuminate lobes tomentulose within, tomentulose and hirsute without, 10–14 mm. long; petals 15–18 mm. long, sulphur-yellow, glabrous, except the marginally ciliate base; ovary subcylindric, costately angled, sparsely pilose, the cells 5-ovulate; carpels 14–17 mm. long, 7–8 mm. broad, yellowish-villous, finally dehiscent to base; seeds ovoid, obscurely papillose, 2–2.5 mm. long.—Woytkowski 35133, a bush to 3.5 meters tall, flower pale orange-yellow. Calyx turbinate at base; synonymy after Baker. Type of *A. calycinum*, indument in part hispid-spreading, by Haenke from "mountain valleys of Peru." F.M. Negs. 7989; 29784.

Cajamarca: Below Guerocotillo, 1,600 meters, Prov. Cutervo, *Weberbauer 7120* (det. Ulbrich).—San Martín: Tarapoto, *Woytkowski 35133* (det. Cuatrecasas).—Huánuco(?): On the Marañón, *Dombey*, type (also of *S. cistiflora*).—Junín: La Merced, *Killip & Smith 23564* (det. Killip).—Lima: Yanga, *Dombey*.

Abutilon pauciflorum St. Hil. Fl. Bras. Merid. 1: 206. 1827.

Growing parts pubescent with long spreading trichomes and tomentose with short stellate ones, the soft leaves paler and especially tomentose beneath; stipules narrowly subulate or filiform to 1 cm. long; petioles soon elongate or nearly equaling the cordate-ovate, acuminate leaves, these crenate-serrate, 9-nerved, the larger about 12 cm. long; flowers solitary, axillary, on long stout peduncles, the roseate obovate emarginate petals exceeding the calyx, densely pubescent marginally at base; calyx cupulate, 12–15 mm. long in flower, the lobes acuminate; carpels 8–10 (12), villous, about 15 mm. long, shortly beaked; seeds puncticulate, tuberculate-hispidulous.—Dr. Hochreutiner has written me that he believes Baker f. was correct in identifying Grisebach's interpretation of *A. pedunculare* HBK. with this species and wonders if the type of HBK. should not include it, another problem beyond the scope of this work. However, Kearney, Leafl. West. Bot. 7: 252. 1955, thinks that the plant of North America and the West Indies may be distinct. F.M. Negs. 19682; 35458.

Peru (probably). West Indies and Mexico to Paraguay.

Abutilon pedunculare HBK. Nov. Gen. & Sp. 5: 273. 1822. *A. pionense* Ulbr. Notizbl. Bot. Gart. Berlin 9: 53. 1924.

Branchlets herbaceous, slender, stellate and pilose the later trichomes spreading; stipules linear-lanceolate, to 1 cm. long, caducous; petioles finally subequaling the lower leaves; these all deeply and narrowly cordate, subrotund, rather abruptly long-acuminate, subentire or repand-denticulate, to 16 cm. long, 13 cm. wide, the upper much smaller, puberulent or nearly glabrous above, softly canescent tomentulose beneath; peduncles a dm. or two long, slender, axillary, solitary, the pendulous blood-red flowers 3.5–4 cm. long; calyx tomentose, about 3 cm. long, cleft to below the middle with lanceolate acuminate lobes; petals oblong-lanceolate, finally reflexing, irregularly denticulate at tip, hirsute marginally toward base, 6–8 mm. wide; stamen tube glabrous; carpels (as styles) 15– about 20, acute, coriaceous, chartaceous, the 3–4 seeds glabrous (HBK.), the fruit 1.5 cm. high, 2 cm. across at base, not enclosed in calyx (Ulbrich).—Related to *A. reflexum*, with leaves tomentose both sides and with smaller flowers and fruits, the latter enclosed in calyx (Ulbrich); differs also in the pilose branches, longer peduncles, form of leaves and number of styles (HBK.). *A. pubistamineum* Ulbr. Repert. Sp. Nov. 13: 500. 1915 has yellow

flowers, lanate stamen tube. See also *A. pauciflorum;* length of peduncles is very variable (B.P.G.H.). F.M. Neg. 35459.

Cajamarca: Among shrubs, trees, Pion, Prov. Cutervo, 1,300 meters, *Weberbauer 7140* (type, *A. pionense*). Chamaya to Tomependa, Prov. Jaén, *Bonpland,* type.

Abutilon piurense Ulbr. Bot. Jahrb. 54: Beibl. 117: 55. 1916.

Branches weak, slender, tomentulose; stipules lanceolate, 4 mm. long, promptly caducous; petioles 1–3 mm. long; leaves deeply cordate-amplexicaul, ovate, long-acuminate, 2–8 cm. long, 1–6 cm. wide, glabrous above, ashy green and rather sparsely appressed stellate beneath, entire or obscurely dentate, the 5–7 palmate nerves prominent; peduncles 4–8 cm. long, solitary, axillary, the roseate flowers nutant; calyx 17 mm. long, the lanceolate acute lobes 9 mm. long, sparsely tomentose without, glabrous within; corolla early campanulate, finally reflexed, 2.5 cm. long, connate nearly 7 mm. with stamen tube, this conoid, glabrous without, stellate within, 2 cm. long; petals oblanceolate, obtuse, glabrous except for some stellate trichomes near base; ovary pilose, multicarpellate; styles 1 cm. long, glabrous as the capitate stigmas.—Compared by author with *A. megapotamicum* St. Hil. & Naud. with stouter erect branches and upright petals. Among other evergreen shrubs. F.M. Neg. 9284.

Piura: Chauro to Hacienda San Antonio, 800 meters, *Weberbauer 6010,* type.

Abutilon pulverulentum Ulbr. Bot. Jahrb. 54: Beibl. 117: 51. 1916.

Younger branches, petioles, these to 6 cm. long, and peduncles, these to 3.5 cm. long, lustrous yellowish puberulent-tomentulose; leaves broadly ovate, angulate to sub-trilobed, obtuse or slightly cordate at base, cuspidate, to 12 cm. long, 6–7 cm. wide, irregularly denticulate, sparsely stellulate above or somewhat densely on the nerves, softly tomentose beneath, the 6–7 palmate nerves and pinnate-reticulate venation there prominent; pedicels in anthesis very short; flowers glomerate on terminal peduncles, soon forming a lax efoliate irregular cyme; calyx yellowish tomentose, 6–8 mm. long, the lobes acuminate; corolla rotate, lilac-tinted, the broadly obovate obtuse petals about 2 cm. long; stamen tube glabrous, 4 mm. long; styles nearly 3 mm. connate, stigmas large, capitate; fruit sparsely pilose, 9 mm. thick, carpels about 15, suborbicular,

apically subangled, glabrous, compressed, the black pyriform solitary seed with an indurate funicle.—Allied to *A. umbellatum* Sweet with pedicellate flowers, beaked fruit, more sparsely pubescent leaves (Ulbrich); but Kearney has pointed out to me that the sketch on the type specimen shows a solitary pendulous ovule and he therefore considers it some species of *Sida*. However, this character varies greatly in the genus, and in the family, for that matter, as in some other families and its facies is that of this genus. Type 3 meters, in wet places. F.M. Neg. 9286.

Cajamarca: San Miguel, 2,600 meters, *Weberbauer 3904*, type.

Abutilon ramiflorum St. Hil. Fl. Bras. Merid. 1: 199. 1827.

Shrubby at least below, the virgate branches, petioles (to 13 cm. long) and leaves on both sides densely sometimes rather loosely tomentose; stipules stellate-tomentose, subulate-acuminate, tardily caducous; leaves broadly ovate, shortly and usually acutely or mucronately acuminate, 8–18 cm. long, 6–16 cm. wide, those at base of the terminal ample panicles much smaller; flowers subtended by stipuliform bracts, the peduncles at anthesis about as long or 5–10 mm. long, to twice as long in fruit; calyx 3–4 mm. long, yellowish-ferrugineous, the yellow petals to 9 mm. long, pilose at base as stamen tube; carpels 6 or 7, chartaceous, stellate-tomentose, dorsally dehiscent to the middle, 7–8 mm. long, the 3 seeds minutely puberulent.—Simulates species of *Wissadula* and ovules in same position but carpels constructed as in *Abutilon* (Schumann), to which statement Hochreutiner replies: there is not the slightest resemblance with any species of *Wissadula!* The Peruvian material seen, as determined in herbaria, is apparently too young to show that in fact the Peruvian specimen may not rather be a *Wissadula* species, as *W. stellata*. F.M. Neg. 35461.

Junín: La Merced, *Killip & Smith 24043* (so det. in various herbaria). To Paraguay and Brazil.

Abutilon reflexum (Juss.) Sweet, Hort. Brit. ed. 1: 53. 1826. *Sida reflexa* Juss. in Cav. Diss. 1: 36, *pl. 7, fig. 7*. 1785. *Sida retrorsa* L'Hér. Stirp. Nov. 133, *pl. 64*. 1789.

Slender stems, petioles, these 1–4.5 cm. long, and peduncles, 5–12 cm. long, minutely stellate-tomentulose or puberulent; stipules subulate, acuminate, tomentose, 7–8 mm. long, more or less caducous; leaves ovate, basally cordate, shortly and acutely acuminate, minutely or subrepand serrate, mostly about 1 dm. long, half as

wide or the lower considerably larger, conspicuously soft-tomentose beneath, green above with some scattered minute stellate trichomes; flowers axillary, solitary, erect or nodding; calyx about 1.5 cm. long, campanulate, truncate at base, the oblong triangular lobes erect or reflexing with the petals, puberulent within; petals purple, narrowly spatulate, dentate at apex, glabrous except marginally stellate-pilose toward base where adnate with stamen-tube for nearly 1 cm.; androecium glabrous; ovary densely villous, cells 3-ovulate, carpels 12 or 14; fruit unknown.—Leaves of the Asplund specimen obtuse, not "acutely acuminate," and more coarsely serrate, thus simulating *A. lateritium*, but may be separated by flower color and pubescence (Fries). No type given for *A. reflexum*. Raimondi determinations by Ulbrich, Goodspeed by Johnston. Flower glowing red (Goodspeed).

Piura: Talara, *Haught 71*. Pariñas Valley, *Haught 67* (det. Ulbrich).—Cajamarca: Prov. Jaén, *Raimondi*. Trujillo to Cajamarca, *Raimondi*.—Lima: San Bartolomé (*Asplund 10869*, det. Fries). Cerros de Matucana, *Raimondi; Goodspeed 11318*. Eulalia Valley, *Goodspeed & Stork 11500*. Río Rimac, *Goodspeed 30211; 33110* (det. Leonard); *Safford*. Prov. Hoara, *Dombey* (type, *S. retrorsa*). Ecuador.

Abutilon striatum Dicks. in Lindl. Bot. Reg. 25, Misc. Not. 39. 1839.

Distinguished in Peru by the glabrous or glabrescent mostly deeply lobed leaves and the showy more or less nodding deep yellow flowers, 1–3 in the upper axils of the slender branches; peduncles elongate; stamen column usually conspicuously exserted; petals 2.5–3.5 cm. long; carpels about 11, 7–9-ovulate.—Probably only in cultivation in Peru or possibly established as an escape. According to Kearney, *A. pictum* (Gill.) Walp. of Argentina is the same. Illustrated, Paxt. Mag. Bot. 7: 53.

Cuzco: Yucay, *Soukup 563*. Uruguay; Argentina?

Abutilon sylvaticum (Cav.) Schum. in Mart. Fl. Bras. 12, pt. 3: 418. 1891. *Sida sylvatica* Cav. Diss. 2: 56. 1786.

Branchlets rather stout, soon glabrate, the tips as petioles, more or less tomentulose; leaves ovate-oblong, attenuate-acuminate, cordate, more or less densely tomentose on both sides, lower leaves (typically) deeply and narrowly cordate, the upper narrowly triangular-cordate; internodes of the flowering branchlets sparsely

and minutely stellulate, otherwise glabrous (as to type); calyx to 17 or 18 mm. long, densely yellowish stellate, the lobes typically acutely acuminate, 10–12 mm. long; petals yellow, to 3.5 cm. long, 22 mm. wide, glabrous except sparsely and shortly pubescent without; stamen tube multistriate (type), little ampliated at base; styles as carpels about 11, the latter inflated, muticous, 1.5 cm. long, ferrugineous-tomentose; seeds 2.5 mm. long, canescent-pilose.—In part after Fries (subsp. *genuinum* R. E. Fr. Sv. Vet. Akad. Handl. ser. 3. 24, no. 4: 7. 1947), who distinguishes two variants, subsp. *Buchtienii* R. E. Fr. and subsp. *Klugii* R. E. Fr., which probably more accurately could be designated varieties; both have densely pubescent flowering internodes, the indument of the second ferrugineous, both more acuminate leaves, more openly cordate, the latter even ovate and more or less sagittate, the former with caudate acuminate calyx-lobes, these for the latter narrowly deltoid, acute and more ferrugineous; further, in the variant *Klugii* the stamen tube is 5-sulcate, the styles and carpels 16. My specimens from stream banks, to 8 meters high, the long graceful branches with short floriferous branchlets. F.M. Neg. 29760.

San Martín: Juanjuí, *Klug 4339* (subsp. *Klugii*). Zepelacio, *Klug 3749* (type, subsp. *Klugii*).—Huánuco: Río Azul (*Asplund 12542*, subsp. *Buchtienii*). On the Río Marañón, *Dombey*, type. Near Muña, *4158*. Mito, *1510*. Cuchero, *Poeppig 1255*.—Ayacucho: Ccarrapa, *Killip & Smith 22442* (det. Killip).—Cuzco: San Miguel, *Cook & Gilbert 1176*.—Puno: Oconeque, *Metcalf 30587?* Bolivia. "Papagaru."

Abutilon umbellatum (L). Sweet, Hort. Brit. ed. 1: 53. 1826. *Sida umbellata* L. Syst. Nat. ed. 10. 1145. 1759. *A. Anderssonianum* Garcke in Anderss., K. Sv. Freg. Eugenies Resa, Bot. 230. 1855; 98, *pl. 15*. 1861, fide Svenson.

Stellate-tomentose or glabrate to the upper corymbose or subumbellate calyces, the indument of the round to ovate leaves minute, denser beneath, of the stems and petioles (1–4 cm. long) glandular-subvillous or sparse; stipules linear, acute, 5–10 mm. long; leaves sometimes somewhat 3-lobed, crenate-serrate, cordate or subtruncate, more or less abruptly acuminate, 3–6 cm. long or longer; bracts 2–3 mm. long; calyx 5–6 mm. long, villous-tomentose, the acute lobes half as long, slightly longer in fruit; petals yellow, 8 mm. long, pubescent at base; carpels 5–7 (11), hirsute-tomentose, the awns about 2 mm. long, each carpel with 3 brown tessellate-tuberculate

seeds.—Svenson, l.c., has discussed the variation of the species in the Galapagos. My collection has 11 carpels, to 9 mm. long. Illustrated, Cav. Diss. 1: *pl. 6;* Svenson, Amer. Journ. Bot. 33: *pl. 15, figs. 1–3,* opposite p. 465.

Piura: Chulucanas to Morropón, *Weberbauer 5967* (det. Ulbrich). —Huánuco: Near Huánuco, *3493* (det. Kearney). To Mexico; Venezuela; West Indies.

Abutilon virgatum (Cav.) Sweet, Hort. Brit. 1: 53. 1826. *Sida virgata* Cav. Icon. 1: 53, *pl. 73.* 1791. *A. mendocinum* Phil. Sert. Mend. Alt. 6. 1870, fide Kearney.

Perennial herb, more or less lignescent at the base; the many erect strict stems stellate-tomentulose above as the petioles, these 1–3 cm. long, and the leaves on both sides; stipules 8–10 mm. long, scarcely 1 mm. wide; leaves ovate, angled or more or less 3-lobed, the middle lobe the largest, cordate at base, serrate or crenate, often 3.5–5 cm. long and nearly as wide; peduncles spreading, 1- or 2-flowered, more or less congested above; calyx about 1 cm. long, campanulate, the lanceolate lobes long-acuminate, puberulent within, tomentose without; petals 7 or 8 mm. long, half as broad near the tips, glabrous even at the base; stamen-tube hispid-stellulate; ovary tomentose, the cells 3-ovulate; carpels complanate-trigonous, bicorniculate, 7 mm. long, 3.5 mm. broad above, dorsally tomentose, finally bivalved even to the base; seeds trigonous, slightly stellulate. —F.M. Negs. 8000; 32633 (*A. mendocinum*); 35549.

Cajamarca: Prov. Chota, *Raimondi.* Prov. Contumazá, *Raimondi* (both det. Ulbrich).—Huánuco: Near Huánuco, *Soukup 2225.* —Ayacucho: Huanta, *Raimondi* (det. Ulbrich). To Chile; Argentina; Brazil.

Abutilon Weberbaueri Ulbr. Bot. Jahrb. 54: Beibl. 117: 53. 1916.

Young branches scabrous-tomentose and viscid-hirsute; stipules subulate, hirsute, to 7 mm. long; petioles subequaling the orbicular leaves, these cordate at base, acuminate, 2–4 cm. long, coarsely serrate, the 7 nerves inconspicuous; flowers solitary in the upper leaf-axils or at the axils of short branchlets, the peduncles mostly about 5 mm. long, articulate 1–2 mm. below the calyx, this cupulate, 7 mm. long, tomentose, within black-dotted, glabrescent, the ovate acute or acuminate lobes 5 mm. long; petals yellow, to 14 mm. long, 12–13 mm. wide, obtuse, glabrous; stamen tube conical, 8 mm. long,

sparsely pubescent with stellate and simple trichomes; styles about 6 mm. long, glabrous as capitate stigmas; fruit with 6 tomentose aristate carpels 8 mm. high, the solitary seeds cordate-ovoid, minutely appressed pubescent.—Allied to *A. virgatum*, which is less pubescent, with long-petioled ovate-lanceolate leaves, long-pedicelled flowers (Ulbrich). Kearney, in herb., allies this to *Bastardia bivalvis*, as the carpels are 1-ovulate, separating from the axis. A meter tall shrub among cacti and other xerophytes (Weberbauer).

Cajamarca: Montaña de Nanchó, *Raimondi* (det. Ulbrich).—Ayacucho: Below Coracora, 2,500 meters, *Weberbauer 5815*, type.

14. MODIOLA Moench

Modiolastrum Schum. in Mart. Fl. Bras. 12, pt. 3: 276. 1891.

A creeping herb with coarsely crenate to palmately parted leaves and an involucel of (2) 3 bractlets, technically like *Sphaeralcea* but ovary cells many (14–20), carpels biaristate, more or less transversely septate between the seeds or seed (*Modiolastrum*), this reduced by Hochreutiner, Ann. Cons. Jard. Bot. Genève 20: 124. 1917, maintained by Krapovickas, who found the chromosome count 5 instead of 9 for the type (*M. caroliniana*).

Modiola caroliniana (L.) G. Don, Gen. Syst. 1: 466. 1831. *Malva caroliniana* L. Sp. Pl. 688. 1753. *M. malvifolia* Griseb. Symb. Argent. 45. 1879, fide Hochreutiner.

Prostrate stems rooting at the nodes, the stems and leaves (or the latter glabrate) pubescent with simple and stellate trichomes; stipules caducous; leaves broadly ovate, the narrow lobes subpinnately lobulate; peduncles solitary or binate, 2–4 cm. long; calyx 6–7 mm. long, the slightly shorter bractlets persisting; petals red, 7–8 mm. long; carpels about 4 mm. long, hirsute dorsally toward the 1 mm. long beak, glabrous and tuberculate-rugose below, the seeds glabrous.—Also to be expected, perhaps, is the variant *M. geranioides* (Hook.) Walp., the plant as the carpels somewhat tuberculate. Hochreutiner has written: surely only one species; all others are varieties or forms. Curious that there seems to be no record of this herb from Peru, so widely distributed as a weed in warmer South America. Illustrated, Mart. Fl. Bras. 12, pt. 3. *pl. 80* (*M. lateritia*). F.M. Neg. 9337 (*M. malvifolia*).

Peru (probably). Tropical and subtropical America; South Africa.

15. SPHAERALCEA St. Hil.

Urocarpidium Ulbrich, Bot. Jahrb. 54: Beibl. 117: 63. 1916?

Like *Malvastrum* but the carpels in two sections usually separated by a deep notch, the apical dehiscent and smooth, the lower indehiscent and utriculate; the stigmas are capitate, the bractlets commonly deciduous soon after anthesis, the species all perennial herbs, at most suffrutescent (Kearney) or annual as interpreted here.—Emphasizing the carpel differentiation as basic, the number of ovules as secondary (as in *Modiola*), the genus includes mostly pluriovulate but also many uniovulate species. The chromosome number is 5 or 10 according to Webber, Cytologia 7: 313–323. 1936, as cited by Krapovickas, Lilloa 17: 179–221. 1949, who has found no species in Peru unless *M. Sandemanii* Sandw. which (in a letter to Kearney) he has decided is a very aberrant species of *Sphaeralcea* for which he would propose subgeneric rank. Inasmuch as this (at this writing—August, 1952) has not been done, it seems inconvenient to retain Sandwith's imperfectly known species in *Malvastrum*. Kearney has noted *S. Endlichii* Ulbr. of Mexico as having almost completely dehiscent carpels, only faintly reticulate at base while the variation of ovule number and carpel-structure within the closely allied *Wissadula* (and *Pseudabutilon*) is suggestive that when all the evidence is in, so to speak, the taxonomy of the tribe may have to be reorganized, as suggested by Jepson, Svenson, Sandwith and others; probably there are more "aberrant" species yet undiscovered. My feeling that the species of Ulbrich belongs here has been supported by Hochreutiner as follows: may be kept distinct if a genus can be characterized by one single character, here the caudate carpels, which is rather variable; if not, may be united with *Sphaeralcea* as an exceptional species with awns.

Sphaeralcea arequipensis (Johnst.) Krapov. Bol. Soc. Argent. Bot. 3: 71. 1950. *Urocarpidium albiflorum* Ulbr. Bot. Jahrb. 54: Beibl. 117: 64. 1916—not *S. albiflorum* Rose, 1890. *M. arequipense* Johnst. Contr. Gray Herb. 70: 74. 1924. *S. Weberbaurii* Krapov., l.c., fide Krapovickas.

Sparsely and minutely stellate pubescent but becoming glabrous, often somewhat branched, 1–several dm. tall; stipules membranous, persisting; petioles 1–1.5 cm. long; leaves ovate-rhombic, obtuse or subtruncate at the broadly cuneate base, subacute, often indistinctly 3–5-lobed, to 3.5 cm. long, 2 cm. or so wide, irregularly serrate; peduncles axillary, to 1 dm. long, the white subsessile flowers

secundly congested toward the tips; subulate bractlets 3–5, caducous, (2) 3–4 mm. long; calyx 4 (–5) mm. long, medially ovate-lobed; petals glabrous, obovate, 4 mm. long; stamen tube 3 mm. long, strongly dilated at base, connate with corolla and falling with it; styles many, free for only 1 mm.; ovary sparsely pilose; carpels about 15, much compressed, 2.5 mm. high, lower part only dorsally reticulate, the single apical spine ciliate, nearly 8 mm. long, the glabrous seed borne in the non-dehiscing reticulate part of the basal cavity.—Petals white (Ulbrich) or light wistaria-violet (Pennell). Syonymy after Krapovickas in letter to Kearney dated June 22, 1952. Ulbrich suggested in herb. that the imperfectly known *M. congestiflorum* Johnst., Contr. Gray Herb. 70: 74. 1924, may be shown to belong here, but for convenience it is retained in *Malvastrum*. Illustrated, Krapovickas, l.c. 73 (*S. Weberbaurii*).

Lima: Rocky outcrops, 1,500 meters, *Weberbauer 5326*, type. San Bartolomé, *Weberbauer 5285*. Ambar, 2,010 meters, *Stork 11436* (det. Johnston). Open rocky slopes, Tingo, *Pennell 13144*.—Arequipa: Near Arequipa, 2,500 meters, *Pennell 13168* (det. Ulbrich).—Moquehua: Open mixed formation, Torata, *Weberbauer 7412* (type, *S. Weberbaurii*). Chile.

Sphaeralcea Sandemanii (Sandw.) Macbr., comb. nov. *Malvastrum Sandemanii* Sandw. Kew Bull. 263. 1950.

Perennial(?), the slender flexuose stems to 3 dm. high, abundantly foliose and floriferous only above with some purplish branchlets from the upper axils, glabrescent below, minutely stellate-pubescent toward the tip; stipules filiform, about 1.5 mm. long; petioles to 1 cm. long; leaves subrotund-ovate (hederiform), 7–12 mm. long, 5–10 mm. wide, about medially 3–lobed, the largest intermediate lobe ovate, acuminate, the lateral much smaller, deltoid, greenish above, canescent beneath, stellate-tomentulose as calyces both sides; flowers solitary or at tip of the axillary branchlets; pedicels glabrous, 2–3 cm. long, bent above the articulation, this 4–7 mm. below apex; bractlets none; calyx tube 3 mm. long, 7 mm. broad, the deltoid ovate acuminate and acute lobes 3.2–3.5 mm. long and wide; petals rose-lilac, about 1 cm. long, nearly as wide, subtruncate; stamen column pilose at base only, the head of anthers 4 mm. thick; carpels (young) as styles glabrous, with 1 ascending ovule, obscurely transversely rugulose, not aristate.—Because of the single ascending ovule this must at present be placed in *Malvastrum* but in habit and facies suggests *Sida* or even *Anoda* and the doubtful validity

of distinguishing *Sida* and *Malvastrum* on this ovular character has been expressed by Svenson, Amer. Journ. Bot. 33: 466. 1946. However, Krapovickas thinks this is an aberrant *Sphaeralcea,* and Hochreutiner has written me that he believes it would be clearer if mentioned under *Sphaeralcea,* not on account of the disposition of the ovule, which is variable, but on account of the rugulose carpels. Since, as indicated under *Malvastrum,* these plants may actually constitute a single group, I venture to transfer this species to the older name and avoid the typographical awkwardness of merely mentioning it.

Arequipa: Chala, 500 meters, (*Sandeman 4020,* type, Kew).

16. MALVASTRUM Gray

Tarasa Phil. Anal. Mus. Nac. Chile, Bot. 10. 1891. *Urocarpidium* Ulbr. amend. Krap. Darwin. 10: 606–636. 1954, part.

Various in habit and endurance, foliage and inflorescence as defined. Involucel ordinarily present. Anthers apical on the filament tube. Ovary cells 5-many, the solitary ovule erect or ascending; stigmas apical, capitate. Carpels uniseriate, indehiscent, only apically dehiscent or completely dehiscent, incurved-rostrate or long-aristate to muticous.—The lateral carpel walls are firm, persisting or thin, soon disintegrating; this is the most difficult genus of Tribe Malveae to define satisfactorily, having the solitary erect or ascending ovule of Subtribe Malvinae and capitate stigmas of Subtribe Sidinae, but being clearly affiliated with Subtribe Abutilinae through the uniovulate species of *Sphaeralcea;* it is very probably of polyphyletic origin (Kearney, l.c. 119). The carpels may split apically but not enough to release the seed (Hochreutiner). The genus *Sphaeralcea* St. Hil. with which *Malvastrum* has been merged (Jepson, Man. Fl. Pls. Calif. 632. 1925) is now restricted to the species with the carpels comprised of an empty upper portion and a fertile indehiscent part; apparently only two species have been found in Peru with this fruit-character; cf. also *Nototriche* for species with completely dehiscent carpels splitting into 2 valves. For discussion see Kearney, Leafl. West. Bot. 5: 23. 1947; 6: 51. 1951. However, at least in floristic work where simplification of generic keys is so desirable, there seems no sound reason for maintaining *Tarasa* as distinct, for its basic character—carpels completely dehiscent, valves finally separating—is a common character developed to extreme degree, and that is variable, pointing to both *Malvastrum* and *Sphaeralcea.*

See also Kearney, Leafl. West. Bot. 6: 51. 1951, and also l.c. 238–251, 1955, where he defines the genus to include only perennial often somewhat woody species of subtropical America having a persistent triphyllous involucre, yellow corolla and nearly indehiscent dorsally smooth, laterally smooth or somewhat rugose carpels; in Peru this definition would apply particularly to *M. americanum*, *M. coromandelianum*, and close allies or variants. So delimited, the known chromosome number is 6–18, Skovsted, Journ. Genetics 31: 263. 1935, in contrast to 15 for the annuals, centering around *M. peruvianum* recently transferred to *Urocarpidium* by Krapovickas, l.c.; compare *Sphaeralcea* St. Hil.; in view of the great variation of characters, the difference in opinions between qualified students, and the existence of species that admittedly are not surely assignable to any other proposed segregates, it seems more than probable that at least in floristic treatments one generic name (*Sphaeralcea*) will suffice and sectional designations would then indicate clearly apparent specific relationship. For convenience when the valid name has not been made in *Malvastrum* the generic name *Urocarpidium* is used.

For the acaulescent group the descriptions have been drawn largely from the account by Hill, Journ. Linn. Soc. Bot. 39: 216–230. 1909. He notes that while this species-group simulates in habit *Nototriche* the indument is comprised of 2–3-forked trichomes except in *M. Richii* and *M. Weberbaueri* and instead of volcanic ash and barren slopes they ordinarily are associated with other plants in argyllaceous soils; then, of course, they usually have the involucral bractlets of *Malvastrum*, these sometimes obsolete or promptly caducous (*M. nubigenum*, *M. oriastrum*), another example of the character-continuity within the family, beautiful if at times annoying! Hill based his key on carpel characters but as these are seldom available or discernible it is largely academic; the size of fully opened flowers appears to be constant, but there seem to be too many species accepted on basis of pubescence and leaf-lobation and shape, making my key also only suggestive.

Material referred in American herbaria to *Malvastrum* has been mostly on loan to Antonio Krapovickas during the preparation of this compilation.

The species particularly that have no involucel or the bractlets caducous are *M. nubigenum*, *M. oriastrum*. *M. Sandemanii*, omitted here, is under *Sphaeralcea*.

Plants acaulescent.

Leaves entire or subcrenate but only near apex; carpels apically hirsute.

Leaves ovate or orbicular, obtuse; calyx lobes acute.
M. parnassiaefolium.

Leaves somewhat obovate, acute; calyx lobes acuminate.
M. alismatifolium.

Leaves crenate to lobate; carpels glabrous or dorsally hirsute, rarely only apically.

Peduncles much longer than petioles; bractlets ovate.
M. Stuebelii.

Peduncles shorter than petioles or little longer; bractlets linear, rarely lanceolate-ovate or obsolete.

Corollas conspicuous, about 2–3.5 cm. long; carpels dorsally hirsute or glabrous (species characters not proved).

Carpels rostrate (Hill), stellate-hirsute; leaves obscurely or not pinnate-lobulate.

Leaves tomentulose-stellate, mostly 3-lobed.
M. Weberbaueri.

Leaves hirsute or glabrous above, irregularly serrate-lobulate.....*M. Bakerianum.*

Carpels erostrate (Hill); leaves usually pinnate-incised or lobulate.

Ovary as carpels pubescent; petals, if purplish, in age toward apex.

Leaves (some) subpinnate-lobulate..*M. Englerianum.*

Leaves less regularly or less deeply subpinnate-incised.
M. Bakerianum, M. acaule.

Ovary as carpels glabrous; petals bluish-white, violet basally.....*M. Hauthalii.*

Corollas small, rarely more than 12 mm. long; carpels hirsute dorsally in *M. oriastrum, M. Richii.*

Plants glabrous unless stipules, bractlets, calyces.

Leaves orbicular, crenate.....*M. rhizanthum.*

Leaves ovate, lobulate or incised-crenate.

Peduncles as petioles short; leaves lobulate.
M. oriastrum.

Peduncles as petioles elongate; leaves incised.
M. nubigenum.

Plants obviously pubescent, especially the petioles and the leaves, at least beneath.

Leaves coarsely serrate or incised.

Carpels glabrous, verruculose; leaves ovate-oblong. *M. nubigenum.*

Carpels densely hirsute, smooth; leaves rotund, subcordate..... *M. Richii.*

Leaves crenate, cordate-rotund.

Carpels dorsally hirsute, smooth; petals white; peduncles 1–2 cm. long..... *M. crenatum.*

Carpels apically puberulent, verruculose; petals purple; peduncles 2–5 cm. long..... *M. betonicaefolium.*

Plants caulescent.

Inflorescence a terminal compact or, early, ovoid-capitate spike. *M. americanum.*

Inflorescence axillary and terminal, flowers sometimes solitary.

Shrubs, the indument close, malpighiaceous-strigose or finely stellate-scabrous or -tomentulose; leaves crenate-serrate (lobulate-incised, *M. operculatum*, *M. Hornschuchanum*).

Indument somewhat strigose-malpighiaceous; carpels aristate..... *M. coromandelianum.*

Indument all or mostly more than 4-rayed trichomes; carpels muticous, cusped, minutely rostrate or dorsally aristate.

Petals yellow; carpel awns various, not elongate-pilose-plumose.

Indument canescent-tomentose; petals 6–7 mm. long; carpels mucronulate..... *M. depressum.*

Indument stellate-scabrous, scarcely tomentulose unless younger parts.

Petals 10–12 mm. long ex char.; carpels minutely rostrate..... *M. scoparioides.*

Petals about half as long; carpels muticous or cusped, dorsally tubercled to aristate (species scarcely distinct)..... *M. scabrum*, *M. scoparium.*

Petals roseate; awns elongate, pilose-plumose.

Leaves oblong-lanceolate, crenulate..... *M. Mandoni.*

Leaves ovate, sometimes narrowly but more or less lobulate or incised.

Petals 5–10 mm. long; stamens capitate.
M. operculatum.

Petals about 15 mm. long; stamens in cylindrical head.
M. Hornschuchanum.

Annual (or biennial) herbs, the indument sparse or mostly coarse, the leaves usually more or less lobed or incised (crenate, *M. Urbanianum*).

Leaves not simply crenate.

Indument, at least mostly, finely stellulate.

Calyx trichomes sessile or not black-stiped; lateral leaf lobes oblong-linear.....*M. Pennellii.*

Calyx trichomes in type dark-stiped; leaf-lobes rhombic-ovate.....*M. tenellum, M. congestiflorum.*

Indument, at least mostly, setulose or hirsute-stellate.

Carpels entirely reticulate and with a small interior endoglossum.

Leaves palmately parted.....*U. chilense.*

Leaves 5-lobed.....*U. Mathewsii.*

Carpels laterally smooth centrally except *M. Shepardae*, without endoglossum.

Upper edge of carpels gibbous; leaves 5-lobed, mostly simply strigose.....*M. Shepardae.*

Upper edge of carpels horizontal; leaves 3–5-lobed, glabrous or nearly above or indument stellate.

Carpels larger than 3 mm., protuberous; leaves 3-lobed, glabrate above.....*U. macrocarpum.*

Carpels to 2.5 mm. large, lightly rugulose; leaves 3–5-lobed, stellate pubescent both sides.
M. peruvianum.

Leaves simply crenate, suborbicular.....*M. Urbanianum.*

Malvastrum acaule (Dombey) Gray, Bot. U. S. Expl. Exped. 150. 1854. *Malva acaulis* Dombey ex Cav. Diss. 2: 82, *pl. 35, fig. 2.* 1786.

Acaulescent, the petioles (3–4 cm. long), rosulate leaves beneath and peduncles, these usually 2-flowered and 2–4 cm. long, more or less strigose-hirsute; stipules membranous, lanceolate, acute, ciliate; leaves subrotund or broadly ovate, truncate or subcuneate at base, 2.5–3.2 cm. long and broad, glabrous above (or pubescent in type?),

the 5–7 lobes unequally and acutely dentate, the serrations ciliate apically; bractlets 2 or 3, oblong-linear, acute, ciliate, 6–9 mm. long; calyx 7–8 mm. long, the ovate-lanceolate acute lobes 5 mm. long, sparsely setose at base without, stellate-tomentose within; petals broadly obovate, 2–2.5 cm. long, basally stellate-tomentose; stamen head cylindrical; carpels about 20, densely stellate-tomentose dorsally.—Root fleshy, napiform, edible (*Dombey*). Description (as other older acaulescent species) after Hill, Journ. Linn. Soc. Bot. 39. 1909. Petals viridine-yellow (Pennell). The carpels may prove to be rostrate or the character variable; in this case the species probably will include the forms or variants *M. Bakerianum*, *M. Englerianum*, to either of which my *905* could be referred; it has lavender flowers, leaves simply hirsute on both sides, minutely rostrate carpels. Inasmuch as the original character describes the entire plant as white-stellate, corolla yellow, three times as long as calyx, the interpretation of the species may be incorrect, but probably (and conceivably as to pubescence) the description was in error, since the common form in the Lima mountains seems to be the plant interpreted by Hill as belonging here. *Herrera 171* from Valle de Paucartambo, not seen, ought to be *M. Bakerianum* as to range, if that species is distinct. Type by Dombey from Cordillera of central Peru without exact locality; also by Maclean.

Lima: Huamantanga (*Mathews 597*). Open rocky slopes, east of Canta, 3,700–4,100 meters, *Pennell 14663* (det. Johnston). Near Yauli, *905*.

Malvastrum alismatifolium Schum. & Hieron. Bot. Jahrb. 21: 318. 1895.

Habit of *M. parnassiaefolium* and similar except for the obovate leaves, these (petioles to 3 cm. long, sparsely ciliate) entire, acuminate, glabrous, to 2.5 cm. long, 10–13 mm. wide; peduncles usually 1-flowered, densely hirsute below the flower, to 9 cm. long; bractlets 3, linear, acute, 6–8 mm. long, scarcely 1 mm. wide, glabrous; calyx 9–13 mm. long, the lobes 6–9 mm. long, 2.5–3 mm. wide at base, marginally strigose, tomentulose within; petals obtuse, claw ciliate, 1.5–2 cm. long; carpels 10, glabrous, sparsely setulose at tip only. —Perhaps a variant of *M. parnassiaefolium* but the leaves quite entire, acute, and sepals acuminate; there is sometimes a 2-flowered peduncle and the reticulate-rugulose carpels are glabrous except for a tuft of trichomes at tip. F.M. Neg. 9306.

Amazonas: Near Centamal and Cumullca between Pacasmayo and Moyobamba (*Stuebel 39*, type).

Malvastrum americanum (L.) Torr. Mex. Bound. Surv. Bot. 38. 1858. *Malva americana* L. Sp. Pl. 687. 1753, fide Fawcett & Rendle. *Malvastrum spicatum* (L.) Gray, Mem. Amer. Acad. n. ser. 4: 22. 1849. *Malva spicata* L. Syst. Nat. ed. 10. 1146. 1759.

Annual or sometimes perennial herb, more or less densely puberulent-tomentose, usually scabrous-stellate or the upper surfaces of the ovate leaves and the calyces tuberculate-hispid; stipules lanceolate-filiform, 4–6 mm. long; flowers capitate or approximate in terminal spikes, sessile, the lowest with small foliose bracts, these mostly 2-cleft, calyx 5 mm. long; petals yellow, 6–8 mm. long; carpels subrostrate or produced in inner angle, hispid dorsally.—Often a meter or so high; leaves irregularly serrate-crenate, very rarely obscurely 3-lobulate.

Junín: Sandy roadside, La Merced, *5293* (det. Hochreutiner). Widely distributed in warm and tropical regions.

Malvastrum Bakerianum Hill, Journ. Linn. Soc. Bot. 39: 228. 1909.

Depressed, leaves rosulate; petioles strigose-hirsute, 1.5–5 cm. long; stipules linear-lanceolate, 1–1.5 cm. long; leaves ovate, rounded or subcordate at base, 2–3 cm. long, 2–2.5 cm. wide, glabrous or sparsely hirsute above in type, hirsute on nerves beneath, crenate-serrate or obscurely lobulate; peduncles 1–3 cm. long, strigose; bractlets persisting, linear, 1–3, 8–9 mm. long, ciliate; calyx 1 cm. long, medially lobed, the ovate acute lobes nearly or quite glabrous without, pubescent within; corolla at first white (or yellow?), 20–23 mm. long, petals broadly obovate, 12 mm. wide, tube 1.5 mm. long; carpels reniform, dorsally stellate, 4.5 mm. long, beak 1 mm. long; seeds reniform, 1.5 mm. long and broad (Hill from *Pennell 13417* with yellowish petals, changing to lavender); sometimes the leaves as the calyces without and the pedicels densely strigose-hirsute, var. *strigosum* Hill, Kew Bull. 160. 1935; or the leaves densely pubescent on both sides with long rigid erect trichomes, forma *hirsutissimum* R. E. Fr., Sv. Vet. Akad. Handl. ser. 3, 24, no. 2: 12. 1947. *Weberbauer 7338*, nearly glabrous except strigose petioles, had brimstone-yellow flowers but lacks the stellate indument and 3-lobed leaves with acute teeth of *M. Weberbaueri*, but so determined by Ulbrich; without carpels its determination is uncertain.

Cuzco: Urcos, 3,600–4,800 meters (*Stafford S32*, var.). Near Cuzco (*Stafford 325*, type, var. *strigosum*). Hills of Saxaihuamán, *Herrera 529* (distr. as *M. parnassiaefolium*). Prov. Paruro, *Vargas*

849.—Puno: Sicuani district (*Stafford 322.*). Grassy meadows and slopes, puna, 3,850 meters, *Pennell 13417* (type, f. *hirsutissimum*). Sta Rosa (*Stafford S30, S31, S31A, S31B*). Argyllaceous fields, Tarapoto (*Hill 74*, type). Pucara, open meadows (*Weberbauer 443*, det. Hill). Vilcanota (*Pentland*, det. Hill).—Moquequa: Saylapa, 3,600 meters, *Weberbauer 7338* (det. Ulbrich, *M. Weberbaueri*). "Cuntur-cupa" (Herrera).

Malvastrum betonicaefolium Hill, Journ. Linn. Soc. Bot. 39: 221. 1909. *M. Purdiaei* Gray, var. *huantense* Baker, Journ. Bot. 29: 171. 1891.

Acaulescent, the rosulate crenate cordate-subrotund leaves pilose beneath especially on the nerves, 1.5–2.5 cm. long, nearly as wide, the membranous lanceolate acute stipules 1.5 cm. long, the petioles 3–7 cm. long, more or less pilose, and the peduncles 2–5 cm. long, densely strigose-hirsute with few-rayed trichomes particularly toward apex; bractlets 2, membranous, glabrous, linear-ovate-lanceolate, acute; calyx 8 mm. long, the acute lobes sparsely pilose without, densely tomentose within; petals purple, 13 mm. long, half as wide, fimbriate; stamens in an elongate head; carpels verruculose, slightly tomentulose apically.

Huancavelica: Near Huanta (*Pearce*, type).—Ayacucho: Putis, Prov. Huanta, *Weberbauer 7589* (det. Ulbrich, *M. nubigenum*).

Urocarpidium chilense (Braun et Bouché) Krap. Darwin. 10: 619. 1954. *Malva chilensis* Braun et Bouché Ind. Sem. Hort. Berlin 1. 1857. *Malva scorpioides* Turcz. Bull. Soc. Nat. Mosc. 36, pt. 1: 562. 1863. *Malvastrum peruvianum* (L.) Gray, var. *scorpioides* (Turcz.) Baker, Journ. Bot. 29. 168. 1891. *M. Hinkleyorum* Johnst., Contr. Gray Herb. 70: 73. 1924, fide Krapovickas.

Erect, glabrate or sparsely villous and setose above; petioles 1–2.5 mm. long, stipules narrowly lanceolate, obliquely acuminate to 13 mm. long, 2–4 mm. wide, glabrous or sparsely ciliate; leaves palmately 3–5-foliolate, 3–4.5 cm. long or larger, the leaflets more or less dentate or lobate, often glabrous except for a bristle terminating each tooth; peduncles 2–6 cm. long, the sessile or subsessile flowers early unilaterally congested; calyx about 4 mm. long, more or less hirsute and within minutely stellate, somewhat accrescent in fruit, the ovate acute lobes about 2.5 mm. long; bractlets 3, filiform, equaling the calyx; corolla white with purplish base or violet; staminal tube glabrous or nearly, 1.5 mm. long, anthers about 10; carpels 15 or so to 1 mm. high, laterally reticulate and with

a minute endoglossum within.—Johnston separated his plant from *M. peruvianum* on the basis of the smaller paler flowers, more slender larger stipules and divided or very deeply lobed leaves and (l.c. 85: 68. 1929) wrote: *M. scorpioides* Turcz. seems to be a phase of it. Illustrated, Krapovickas, l.c. 617 (carpel), *fig. 2; pl. 3* (*M. scorpioides*).

Arequïpa: Chachani Mountain, 2,100 meters, (*Hinkley 43*, type, *M. Hinkleyorum*). Ataquita, *Goodspeed Exped. 15634*. San Lazaro, (*Cerrillo 38*). Yara, (*Vargas 8013*). Chile.

Malvastrum congestiflorum Johnst., Contr. Gray Herb. 70: 74. 1924.

Herbaceous sub-simple annual 1-several dm. high, the flexuose stems deciduously stellate-tomentose, densely lanuginose toward the apex; stipules lanceolate, about 5 mm. long; petioles stellate, 5–20 mm. long; leaves rhombic-ovate, acute, coarsely sinuate-dentate, entire toward cuneate base, rarely palmately 3-lobed, the obovate obtuse lobes coarsely few-dentate, or apparently sometimes all of the leaves 3-lobed, and the lobes obtusely incised-dentate, in type 2–5 cm. long, 1.5–3 cm. broad, or to twice as large; flowers in dense sessile terminal glomerules (type) or the glomerules in age shortly pedunculate; calyx about 5 mm. long, tomentose, the ovate acute lobes 3.5 mm. long; bractlets 3, linear, 3–4 mm. long; corolla pale, about 4 mm. long, the obovate rounded lobes 2.5–3 mm. long; stamen-tube sparsely long-villous, as the filiform styles; ovary depressed, globose, densely stellate-tomentose.—Apparently related to *M. tarapacanum* (Phil.) Baker of Chile, but distinguished by its larger green, rather than tomentose foliage, pale corollas, and non-aristate fruit (Johnston); my collections have 3-lobed leaves but dark-stiped calyx trichomes. *M. multicaule*, lit., is apparently a nomen nudum, even transferred without description from *Malva* to *Malvastrum*, based on *Lechler 1784* from Puno, not seen by me.

Arequipa: Rocky ravines, south slope of Chachani Mountain, 2,745 meters (*Hinckley 37*, type). Pampa de Arrieros, *Pennell 13328* (det. Johnston, *M. tenellum*).—Cuzco: Ollantaitambo, *Pennell 13656* (det. Ulbrich, *M. multicaule*).—Lima: Garden edge, Viso, *755* (det. Johnston).—Puno: Chuquibambilla, *Pennell 13387* (det. Johnston, *M. tenellum?*).

Malvastrum coromandelianum (L.) Garcke, Bonplandia 5: 295. 1857. *Malva coromandeliana* L. Sp. Pl. 687. 1753.

Appressed strigose with single and bifurcate trichomes including the calyces on their many angles; stipules lanceolate, acuminate, 7–9 mm. long; petioles 1–2 cm. long; leaves ovate to oblong, usually 3–6 cm. long; flowers early solitary, later on subsidiary branchlets, the peduncles 1–3 mm. long; calyx and bractlets subequal, the former to 7 mm. long in fruit; petals yellow, 8–9 mm. long; carpels with 1 long apical spine and 2 medial dorsal cusps or short spines. —Illustrated, Fawcett & Rendle, Fl. Jam. 5: 105.

Huánuco: Near Huánuco, *Soukup 2225A*. Warmer and tropical areas.

Malvastrum crenatum Hill, Journ. Linn. Soc. Bot. 39: 227. 1909.

Depressed, the leaves rosulate; petioles 3–5 cm. long, densely strigose-tomentose as leaf-margins and nerves beneath; stipules lanceolate, glabrous, 3–4 mm. long; leaves cordate-orbicular, about 1.5 cm. long, 2 cm. wide, the younger especially above strigose; 5–7-lobulate-crenate; peduncles 1–2 cm. long, densely ciliate; bractlets three, 4 mm. long, glabrous or ciliate; calyx 5–7 mm. long, glabrous except ciliate-margined; corolla white, 8–12 mm. long, petals 1 cm. wide, emarginate, the hirsute tube 2 mm. long; stamens in obconic head; carpels rounded, dorsally hirsute.—Resembles *M. rhizanthum* in leaf-form and flower-size but differs in pubescence and ciliate calyx lobes (Hill). My collection was distributed as *M. Richii*, with which species it is easily confused; the leaves are not so definitely lobed as in Weberbauer's collection (Fries). F.M. Neg. 4311.

Junín: Near Yauli, 4,400 meters, *Weberbauer 360*, type. Cerro de Pasco, 4,200 meters, *3058* (det. Fries). Without locality (*Maclean*).

Malvastrum depressum (Benth.) Svenson, Amer. Journ. Bot. 33: 465. 1946. *Sida depressa* Benth. Bot. Voy. Sulphur 69. 1844. *M. dimorphum* T. Howell, Proc. Calif. Acad. Sci. ser. 4. 21: 331. 1935, fide Svenson.

Densely canescent- and somewhat viscid-tomentose shrub (or early subherbaceous) becoming sometimes a meter or two tall, the orange-yellow flowers to 1.5 cm. in diameter; petioles about 2(–5) cm. long; leaves ovate, cordate or broadly cuneate at base, crenate, mostly 2–3.5 cm. long, about as wide, or the lower to twice as large; primary pedicels 1–2 cm. long (Howell) the later nearly obsolete,

solitary or mostly several on axillary branchlets; bractlets 3, filiform, 5 mm. long; calyx 1.5–2 cm. across, the ovate subacuminate lobes 5–10 mm. long, 4 mm. wide in fruit; petals subentire, barbate at base; carpels about 10, pubescent, to 4 mm. long, with 2 prominent beaks at outer angle and an obscure erect cusp at the inner angle, the obliquely reniform seed smooth (after Howell).—Compare the similar—perhaps scarcely distinct—*M. scabrum*, *M. scoparium*. Illustrated, Svenson, l.c., *pl. 15, fig. 5*, opposite p. 465; *pl. 16, fig. 6*, opposite p. 469.

Piura: Disintegrated granite, Amotape Hills (*Haught & Svenson 11521*). La Brea, Prov. Paita, *Weberbauer 7760*.—Cajamarca: Prov. Cutervo, *Stork & Horton 10208*. Galapagos; Ecuador.

Malvastrum Englerianum Ulbr. Bot. Jahrb. 42: 115. 1908.

Depressed, acaulescent; stipules linear-lanceolate, 1–1.5 cm. long or longer, persistently ciliate; petioles 2–4 cm. long; leaves rosulate, erect, broadly ovate, truncate or subcordate at base, 5–7-pinnatifid or incised, rarely subentire, glabrous above, ciliate, beneath stellate and simply pilose especially on the prominent nerves, 1.5–2.5 cm. long, 12–20 mm. wide; peduncles pilose, 12–15 mm. long; calyx about 12 mm. long, medially parted, the ovate-deltoid lobes acuminate, strigose, the linear-lanceolate involucral hirsute-strigose segments 10–12 mm. long; petals white, 2.5–3 cm. long, 12–15 mm. wide, truncate or emarginate, ciliate at base where connate for 3–4 mm.; stamen tube 8 mm. long, efilamentous for about 5 mm.; ovary densely pilose.—The divided leaves distinguish it at once from *M. acaule* (Ulbrich); however, some of the leaves of the type are shallowly lobulate. Perhaps my *905*, from Yauli, Junín, belongs here, with minutely rostrate stellate-hirsute carpels, pale lavender flowers but the leaves are simply hirsute on both sides. F.M. Neg. 9312.

Cajamarca: Punos, Chacabamba to Aguanuco, *Raimondi* (det. Ulbrich).—Ancash: Tallenga to Piscapacha, 3,800 meters, *Weberbauer 2888*, type.

Malvastrum Hauthalii Ulbr. Bot. Jahrb. 42: 114. 1908.

Acaulescent from stout (to 2.5 cm. thick) rhizomes, the rosulate leaves multilobed; stipules membranous, ciliate, lanceolate, 5–6 mm. long; petioles 1–2 cm. long; leaves broadly ovate or suborbicular, 12–20 mm. long and nearly as wide, the 6–9 lobes irregularly pinnatifid or divided, above sparsely, beneath glabrate or in type

densely stellulate and pilose, the trichomes mostly simple; peduncles 1–2 cm. long; involucral segments 2 or 3, filiform or narrowly lanceolate or subulate, sub-glabrous except pilose margins, yellowish, 5–6 mm. long; calyx 9–10 mm. long, lobes 5–6 mm. long, glabrate in age; petals 20–23 mm. long, violet in herb., ciliate at base and scarcely connate 1 mm.; stamen tube glabrous, efilamentose 6 mm.; ovary glabrous.—Related to *M. Englerianum* (Ulbrich), but differs in fruit characters (Hill). The Weberbauer specimen has nearly glabrous, more cordate-orbicular leaves, but the young carpels are glabrous and minutely muriculate; the petals are described by Weberbauer as bluish white with a violet spot on the lower part. F.M. Neg. 9315.

Cuzco: Puno near glaciers of the Auzengate, 4,500 meters, *Weberbauer 7773* (det. Ulbrich). Bolivia.

Malvastrum Hornschuchanum (Walp.) Macbr., comb. nov. *Sphaeralcea Hornschuchana* (Walp.) Baker, Journ. Bot. 31: 363. 1893. *Malva Hornschuchiana* Walp. Nov. Act. Acad. Leop.-Carol. 19. Suppl. 1: 303. 1843. *Malvastrum Rusbyi* Britton, Bull. Torrey Club 16: 64. 1889, fide Krapovickas.

Branching shrub, the type 2.5–3 dm. high, the young branchlets and leaves densely stellate-pubescent; petioles slender, 2–4 cm. long; leaves ovate-reniform, crenate, 3-lobed, the terminal lobe longest; peduncles axillary, 1–8 cm. long; flowers purplish, many, capitately congested, 2–3 cm. wide; bractlets beautifully stellate-tomentose. —After Britton, the type from La Paz, who allied the species to *M. capitatum* Griseb. Goett. Abh. 19: 90. 1874. Actually it seems to be a form or state of *M. operculatum*.

Cuzco: Pillahuata, Prov. Paucartambo (*Herrera 3329*).—Arequipa: Tiabaya, *Pennell 13090* (det. Johnston, *M. Rusbyi*). Bolivia.

Urocarpidium macrocarpum Krap. Darwin. 10: 624. 1954.

A more or less stellate-pilose annual (apparently) with 3 lobed and serrate-crenate leaves exceeded slightly by few-flowered solitary axillary spikes of roseate or purple flowers, the petals about 7 mm. long; petioles to 1.5 cm. long, stipules triangular, 3 mm. long, half as wide; bractlets 2 or 3, lanceolate, pilose as the campanulate accrescent calyx without, this at anthesis 7 mm. long, the teeth 4.5 mm. long, 2 mm. wide at base; petals obovate, obliquely truncate, slightly pilose basally as the staminal tube, this 3 mm. long with about 12 reniform anthers; stigmas capitate, apically papillose,

about 10; carpels scabrous, indehiscent, 3 mm. high, 3.5 mm. thick, with conspicuous protuberances and irregularly rugose; seeds reniform.—Well marked by the large flowers and fruits, these notably roughened (author). Illustrated, l.c., *fig. 3, d, e, f* (calyx, flower) and *pl. 5* (type); l.c. 617, *fig. 2, j* (carpel).

Lima: Canta (*Pennell 14589*, type). Matucana, *92*. Viso, *Goodspeed Exped. 11542*.

Malvastrum Mandoni (Baker f.) Macbr., comb. nov. *Tarasa Mandoni* (Baker f.) Kearney, Leafl. West. Bot. 5: 190. 1949. *Sphaeralcea Mandoni* Baker f., Journ. Bot. 31: 364. 1893.

Stem ligneous, virgate, to several meters high; stipules lanceolate, acuminate; petioles 1.5–2.5 cm. long; leaves oblong-lanceolate, obscurely cordate at base, acute, 7–12 cm. long, pubescent on both sides, paler beneath; flowers peduncled in the axils or subsessile and aggregate toward the tips of the stems; sepals lanceolate, acuminate, canescent-tomentose; petals obovate, pink-purple, 15–18 mm. long; carpels including the 2 awns pubescent, the solitary seeds reniform (Baker).—Loose-branched slender trees, the flowering twigs "weeping," to 7 meters tall (Balls); but apparently ordinarily a shrub flowering when only a few dm. high. F.M. Neg. 23738.

Huancavelica: Mejorada, *Stork & Horton 10899*.—Ayacucho: Huanta, *Weberbauer 7512* (det. Ulbrich).—Cuzco: Machupicchu, 2,400 meters, *Herrera 1962* (det. Ulbrich); *Mexia 8080A* (det. Killip); *Balls B6807*. Bolivia.

Urocarpidium Mathewsii (Turcz.) Krap. Darwin. 10: 616. 1954. *Malva Mathewsii* Turcz. Bol. Soc. Nat. Mosc. 36, pt. 1: 563. 1863.

Annual similar to *U. chilense* but the leaves at least typically merely 5-lobed and dentate-crenate, the stipules only to 2 mm. broad and, especially the carpels 2 mm. high.—Krapovickas, l.c. 620, has noted that *Pennell 13149* and *Weberbauer 7411* appear to be intermediate in character; possibly this suggests that this group of annual forms will prove to concern one variable genetic entity. Illustrated, Krapovickas, l.c. (nutlet) *fig. 2*, (chromosomes) *fig. 1.; pl. 2* (type).

Cajamarca: Contumazá, *Raimondi 7136*, and others.—Ancash: Lomas de Mongon. *Goodspeed Exped. 9179;* Lomas de La Chay, *Goodspeed Exped. 9215*.—Lima: Lurín, *5944*. Chorrillos, *5862*. Valle del Rimac, *Grant 7428*. Chancay, *Stork & Vargas 9366*.

Lomas de Pativilca, *Goodspeed Exped. 9227.* Lomas de Dona Maria, *Goodspeed Exped. 9256.* Barranca, *Worth & Morrison 9116.*—Arequipa: Mollendo, *Vargas 8458; Cook & Gilbert 52.* Chile.

Malvastrum nubigena (Walp.) Bak. f. Journ. Bot. 29: 172. 1891. *Sida nubigena* Walp. Nov. Act. Acad. Leop.-Carol. 19. Suppl. 1: 307. 1843. *Malva nubigena* Wedd. Chlor. And. 2: 276. 1857. *M. parnassiaefolia* (Gray) Wedd. var. *lobulata* Wedd. l.c., 275. *Nototriche incisa* Turcz. Bull. Soc. Nat. Mosc. 36, pt. 1: 568. 1863.

Acaulescent, the caudex ligneous, the petioles (1–7 cm. long), peduncles (1–9 cm. long) and leaves glabrous or more or less strigose-hirsute especially the younger leaves beneath on the nerves; stipules to 12 mm. long; leaves ovate-oblong, cuneate to cordate at base, 1–3 cm. long, 9–25 mm. wide, 5–7-lobed, or irregularly incised-crenate or lobulate; bractlets early caducous, 1–3, linear or filiform, glabrous or ciliate, 3–6 mm. long; calyx 5–8 mm. long, the ovate acute lobes 3–5 mm. long, a little pilose only within; petals violet, to 2 cm. long; stamen head obovoid, brush-like; carpels about 10, glabrous, verruculose.—Variable in leaf-form (cf. Hill & Burtt, Lilloa 4: 279, *fig. 1.* 1939) and var. *bipinnatifidum* R. E. Fr. Sv. Vet. Akad. Handl. ser. 2. 24, no. 2: 11, *pl. 2, fig. 10.* 1947, from adjacent Bolivia. Synonymy after Hill.

Krapovickas, Darwin. 10: 609. 1954, observed that this species is aberrant not only in the verruculose carpels but in having 10 instead of 6 diploid chromosomes.

Ayacucho: Choimacota Valley, Prov. Huanta, 3,700 meters, *Weberbauer 7589* (det. Ulbrich).—Puno: Tissaloma, 4,570 meters (*Meyen*). Bolivia.

Malvastrum operculatum (Cav.) Hochr. Ann. Cons. Jard. Bot. Genève 20: 129. 1917. *Malva operculata* Cav. Diss. 2: 65, *pl. 35, fig. 1.* 1786. *Tarasa plumosa* (Presl) Kearney, Leafl. West. Bot. 5: 190. 1949. *Malva plumosa* Presl, Rel. Haenk. 2: 124. 1835. *Malvastrum plumosum* (Presl) Gray, Bot. U. S. Expl. Exped. 147. 1854.

Entire plant canescent stellate; stipules linear-subulate, small; petioles to 3 cm. long; leaves narrowly or broadly ovate to truncate or cordate-suborbicular, obscurely or acutely 3-lobate, the middle lobe twice as long as the lateral, all unequally incised-dentate to repand-crenate, more or less 4 cm. long and wide; bractlets 3, linear; corolla purplish, twice as long as calyx; stamen tube early villous;

ovary villous; carpels about 9, tomentose and with 2 plumose awns 6 mm. long or twice as long as the carpel body, operculate.—There seems to be only one species but some Peruvian specimens have been referred to *T. Rahmeri* Phil. Anal. Mus. Nac. Chile, Bot. 10: *pl. 1.* 1891, which according to Reiche appears to differ only by its triangular-oblong acute dentate leaves truncate at base, and possibly separable as a variety. The type of *M. plumosa* was by Haenke from "Peru and Chile." F.M. Neg. 23736.

Lima: Obrajillo (*Wilkes' Exped.*). Río Chillón, *Pennell 14465* (det. Johnston). Without locality (*Mathews 776*, fide Gray). Hoara, *Dombey*, type. Matucana, *263.*—Arequipa: Chala, *Worth & Morrison 15699* (det. Johnston, *Palaua* sp.?). Yura, *Schmidt.* Río Chile, *Munz 15514.* Vincocaya, *Rose 18948.* Pampa de Arrieros, *Rose 18971.* Lower slopes Mt. Misti, *Sandeman 3735.* Near Arequipa, *Pennell 13161* (det. Johnston); and Tingo, *13142.* Chile. "Tarasa."

Malvastrum oriastrum (Wedd.) Baker, Journ. Bot. 29: 172. 1891. *Malva oriastrum* Wedd. Chlor. And. 2: 277. 1857.

Acaulescent, the caudex ligneous, glabrous unless stipules, bractlets and calyx within; stipules membranous, lanceolate, acute, 1 cm. long, sparsely ciliate; petioles dilated at base, 2.5–3.5 cm. long; leaves ovate, subcuneate at base, acute, 2.5–3 cm. long, 1.5–2 cm. wide, lightly to deeply 5–7-pinnate-lobed, the lobes unevenly crenate-dentate; peduncles 1–2 cm. long; bractlets often obsolete or caducous, subulate, ciliate, about 5 mm. long; calyx 9–10 mm. long, the lobes 6 mm. long, acute, glabrous without, velvety tomentose within; petals white, 15 mm. long, 10 mm. wide; stamen head cylindrical; carpels hirsute at tip.—The abortion of the involucel in some cases cannot be considered in any way to exclude this species, so nearly related to other Malvastrums (Hill). F.M. Neg. 35515.

Ayacucho: Mountains of Ayacucho (*Pearce*). Bolivia.

Malvastrum parnassiaefolium (Hook.) Gray, Bot. U. S. Expl. Exped. 150. 1854. *Sida parnassiaefolia* Hook. Icon. 4: *pl. 385.* 1841. *Malva parnassiaefolia* (Hook.) Wedd. Chlor. And. 2: 275. 1857.

Acaulescent from a fusiform root, the rosulate basally cordate-ovate leaves entire or slightly crenate toward the obtuse tips, glabrous or sparsely pilose beneath on the nerves, usually about 1.5 cm. long and nearly as wide; stipules membranous, glabrous,

lanceolate, acute, about 1 cm. long; petioles 3–5 cm. long, sometimes sparsely setose, as the solitary peduncles, these to 7 cm. long; bractlets 1 or 2, linear, 5 mm. long, glabrous; calyx 9–11 mm. long, the lanceolate acute lobes 6–7 mm. long, sparsely setulose without, densely setulose-tomentose within; petals violet or white, 13–18 mm. long, obtuse, stellate-tomentose below as stamen tube, the anthers elongate-capitate; carpels 1–12, a little verruculose dorsally and stellate pubescent especially toward the tip.—Marked, with *M. alismatifolium*, to which the Weberbauer collection was once referred, by the entire or subentire leaves.

Cajamarca: Coymaloche Pass above Hualgayoc, 4,000 meters, *Weberbauer 3993;* 271. Ecuador.

Malvastrum Pennellii Ulbr. Notizbl. Bot. Gart. Berlin 11: 524. 1932.

Sparsely branched glabrescent annual, the sparsely stellate puberulent stems 2 dm. or more long; stipules narrowly lanceolate, sparsely fimbriate, green, 3–5 mm. long, 1–1.5 mm. wide; leaves at the ends of the branches pedately 3-lobed or sub-5-lobed (petioles 1.5–3 cm. long), rather thin, sparsely stellate on both sides, bright green, about 5 cm. long, 5–6 cm. wide, the middle lobe 1–1.5 cm. wide at base, dilated to 2–2.5 cm. wide toward the tip, the oblong-linear lateral lobes 8–12 mm. wide, all somewhat dentate; flowers solitary in the leaf-axils or crowded at branchlet tips, some subsessile on peduncles 7–12 mm. long, purple, 7–8 mm. broad; calyx patelliform, yellowish, green-margined, sparsely stellate without, the ovate lobes 4–5 mm. long, about as wide at base, little exceeded by the glabrous mostly closed corolla; fruit nearly enclosed in the little enlarged calyx, the glabrous compressed reticulate carpels 3–4 mm. long, 2 mm. wide, 1 mm. thick, the single seed triangular-ovoid, 2 mm. long.—Easily recognizable by the large bright green leaves with very regular linear-oblong lobes; allied to *M. jacens* Wats. of Mexico, long-petioled, thinner more pubescent leaves (Ulbrich). The name commemorates meritoriously Francis W. Pennell, news of whose death relatively early (in 1952) I received with great regret. Krapovickas has questioned the generic position of this plant in a letter to Kearney. The Pennell specimens from open sandy places were referred by Johnston to *M. tenellum* (Cav.) Hieron. Bol. Acad. Nac. Córdova 4: 15. 1881, of Argentina, perhaps correctly.

Arequipa: Rock ledges, 2,600 meters, near Arequipa, *Pennell 13206*, type. Near Arequipa, *Pennell 13170?*

Malvastrum peruvianum (L.) Gray, Bot. U. S. Expl. Exped. 146. 1854. *Malva peruviana* L. Sp. Pl. 688. 1753. *Malva limensis* L. Amoen. Acad. 4: 325. 1756, fide Johnston. *M. limense* (L.) Ball, Journ. Linn. Soc. Bot. 22: 32. 1885. *M. peruvianum* (L.) Gray, var. *limense* (L.) Baker f., Journ. Bot. 29: 168. 1891. *Malva echinata* Presl, Rel. Haenk. 122. 1835? *M. costata* Presl and *M. Haenkeana* Presl, l.c. 123?

More or less stellate-pubescent annual, 1-several dm. tall, branching from near the base, the indument hirsute especially on the peduncles and calyces of the axillary secund racemes of lavender or rarely white flowers; stipules ovate-lanceolate-subulate, to about 6 mm. long; petioles 1–2.5 cm. long; leaves ovate to subrotund, more or less clearly 3 (5)-lobate (sometimes medially), irregularly serrate, subtruncate or subcordate, usually about 3–5 cm. long and wide, sometimes twice as large, often glabrate especially above; racemes ordinarily in all the upper axils and 2–4 cm. long, the slender peduncles about as long; pedicels in fruit to 3 mm. long; bractlets 3, filiform, subequaling the calyx, this in fruit nearly 5 mm. long, the corolla sometimes white with purplish base, 3–4 mm. long, little exserted; calyx lobes ovate, acute or apiculate; carpels about 12, dorsally rugulose, nearly glabrous, 2–4 mm. long.—Usually in loose or sandy soils or disturbed fields as a weed. Perhaps too broadly drawn but there seems to be variation without stabilization or concomitance in degree of leaf incision, size and color of flowers, size and shape of stipules; my *92* seemed to be var. *scorpioides*, leaves deeply lobed, now *U. macrocarpum* Krap. In view of the many species already questionable here, it seems strange others could be added, so presumably they must have characters. The species of Presl, all based on collections by Haenke from mountains or valleys of Peru, unknown to me, were separated by the author as follows: *M. echinata*, like *M. peruviana* but much branched, decumbent, leaves 3- instead of 5-lobed, broadly cuneate instead of cordate at base, middle lobe little instead of larger (than lateral), flowers axillary, solitary or in a capitate raceme, bractlets 2; *M. costata*, affine *M. limensis* and *M. echinata* but very distinct especially in the carpels, these 8, reniform, obtuse at both ends, glabrous, transversely costate and impressed puncticulate; *M. Haenkeana*, affine *M. limensis* but most diverse in tomentum, flowers and carpels, the erect branches, leaf-nerves beneath and spikes tomentose; leaves 3–5-lobed, cordate; bractlets 3, setaceous; corolla twice as long; carpels acute at both ends, tomentose, biaristate. This, ex char.,

seems to be distinct and possibly is an earlier name for *M. congestiflorum* or *M. Pennellii*. Hochreutiner has suggested that *M. costata* may prove to be a species of *Wissadula*. Some of the following may belong to segregated forms. Illustrated, Krapovickas, l.c. 617. *fig. 2* (carpel); *pl. 7* (type).

Cajamarca: Below San Miguel, 2,000 meters, *Weberbauer 188*.—Lima: Prov. Huarochiri, *Goodspeed Exped. 11605* (det. Krapovickas). Chicla (Ball). Canta, *Pennell 14589; 14591*. San Buenaventura, *Pennell 14550*. Río Blanco, *Killip & Smith 21678* (det. Krapovickas). Near Lima and Obrajillo, *Wilkes' Exped.; Weberbauer 145; 169*.—Junín: Tarma, *Killip & Smith 21782* (det. Krapovickas).—Huánuco: Acomayo and Pillao, 2,100 meters, *Woytkowski 34176; 34265* (det. Cuatrecasas). Near Huánuco, *2040*.—Huancavelica: Yauli, 3,500 meters, *Stork & Horton 10862* (det. Standley).—Cuzco: Ollantaytambo, *Herrera 3409*. Experiment Est. Kairu, *Vargas 666; 669* (det. Standley).—Arequipa: Mejia (*Günther & Buchtien*, det. Bruns). Posco (*Günther & Buchtien 200A; 210; 211*, det. Bruns). Cachendo (*Günther & Buchtien 231; 214*, det. Bruns).—Puno: Salcedo, *Soukup 499*. Chile. "Rupfu" (Vargas).

Malvastrum rhizanthum Gray, Bot. U. S. Expl. Exped. 148. 1854. *Malva rhizantha* (Gray) Wedd. Chlor. And. 2: 276. 1857.

Acaulescent from a fusiform tuberous root, completely glabrous (except calyx); petioles mostly 3.5–4 cm. long; leaves rotund or obovate-orbicular, mostly subcordate, about 18 mm. in diameter, crenate or doubly serrate, coarser serrations few, the obtuse teeth early bristle-pointed, 3–7-plinerved; peduncles 1-flowered, congested, much shorter than petioles even in fruit; bractlets 3, linear, not even ciliate, shorter than calyx, this 4–6 mm. long, the ovate rather obtuse lobes pilose only within, the corolla 6–10 mm. long; stamens in a globose head; fruit depressed, the rather membranous carpels rounded, but the dorsal angles with 3–4 soft long teeth; seed reniform.—After Gray; according to Mathews the carpels are verruculose. My collections were from rocky short-grass slopes.

Junín: Above Baños, *Wilkes Exped.*, type. Cerro de Pasco, 4,200 meters, *3057* (det. Fries); (*Mathews 911; 894*).—Lima: Río Blanco, 4,500 meters, *3025* (det. Fries). Viso, about 3,000 meters, *600*. Yauli, *Weberbauer 221*.

Malvastrum Richii Gray, Bot. U. S. Expl. Exped. 149. 1854.

Acaulescent, hirsute all over even to the base of the corolla, with stellate trichomes, the crowded rotund subcordate leaves and pe-

duncles on the crown of a thick napiform root; petioles to 2.5 cm. long; leaves about 12 mm. across, coarsely doubly serrate or incised, strongly 5-nerved; peduncles umbellately congested, 6 or 8 mm. long, 1-flowered, sometimes with 1 or 2 bractlets like the 2 or 3 glabrous or ciliate linear-setaceous ones of the involucel, these half as long as the hirsute calyx; corolla slightly longer than the calyx, this 4–6 mm. long, nearly glabrous within.—Like *M. rhizanthum* and *M. acaule* but smaller in all parts and pubescent (Gray).

Junín: Baños, *Wilkes' Exped.*, type. San José, 4,000 meters, *1143* (det. Fries). Cerro de Pasco (*Asplund 11735*, det. Fries).

Malvastrum scabrum (Cav.) Gray, Bot. U. S. Expl. Exped. 147. 1854. *Malva scabra* Cav. Diss. 5: 281, *pl. 138, fig. 1.* 1788.

Shrub sometimes about a meter high, greenish but closely and finely stellate pubescent including the calyces; petioles 0.5–2 cm. long; leaves ovate, rather coarsely serrate, rounded-truncate at base, subacute, usually about 3 cm. long, 2 cm. wide or twice as large; flowers clustered in all the upper axils, subsessile; calyx somewhat accrescent in fruit, finally about 1 cm. across, the lanceolate-ovate acuminate lobes about 5 mm. long; flowers 5–7 mm. long, yellow; carpels dorsally tubercled, apically muticous (or nearly).—Differs perhaps too slightly from *M. scoparium* (Gray); and probably the fruiting characters will be found to be inconstant. Since writing this my idea that this should be included in *M. scoparium* has been confirmed by Hochreutiner but the characterizations may stand since both names are still in general use. F.M. Neg. 29768.

Food plant of Vanessa Caryi (Smyth).

Lima: *Dombey*, cultivated, type. Obrajillo, *Wilkes' Exped.* Chosica, 531.—La Libertad: Chicama Valley, common in neglected fields, *Smyth 49* (det. Killip).

Malvastrum scoparioides Ulbr. Notizbl. Bot. Gart. Berlin 11: 525. 1932.

Erectly branched, scabrous-stellate-tomentose shrub; stipules about 5 mm. long; petioles 1–1.5 cm. long; leaves rhomboid-ovate, 2–4 cm. long, 2–3 cm. wide, coarsely crenate-serrate, little cinerescent, prominently nerved beneath; flowers solitary or congregated at the ends of the branches, subsessile; bractlets 5–7 mm. long; calyx patelliform, early 5 mm., later 8–10 mm. in diameter, lobes subacute, 5 mm. long, 3–4 mm. wide at base; petals yellow, oblong-ovate, 10–12 mm. long; stamen tube 6–7 mm. long, fimbriate at

base; fruit 2–2.5 mm. high, 8–10 mm. across, the 10–12 carpels stellate-tomentose with 2 minute lateral beaks, 1 apical nearly 1 mm. long.—Type nearly 3 meters tall. Belongs in the neighborhood of *M. scoparium* (L'Hér.) Gray differing in size of flowers, fruits and leaf-indentation (Ulbrich). F.M. Neg. 9310.

Ancash: Near brook below Pampa Ramos, 2,000 meters, (*Weberbauer 3196*, type).

Malvastrum scoparium (L'Hérit.) Gray, Bot. U. S. Expl. Exped. 147. 1854. *Malva scoparia* L'Hérit., Stirp. Nov. 53, *pl. 27.* 1785.

Like *M. scabrum* but as to type differs in the somewhat larger merely crenate scarcely dentate leaves canescent at least below and, especially, in the erect beak at the incurved apex of the carpels these also with dorsal awns (Gray).—Schuman, however, Fl. Bras. 12, pt. 3: 270. 1891 found no fundamental difference and Hochreutiner has written me that he believes there is none and that this is the earlier name, the dates as given originally and by Pritzel having been rectified by Otto Kuntze. F.M. Negs. 7990; 9324.

Huánuco: Near Huánuco, *Dombey*, type. "Escoba cimarona" (Dombey).

Malvastrum Shepardae Johnst. Contr. Gray Herb. 70: 75. 1924. *Urocarpidium Shepardae* (Johnst.) Krap. Darwin. 10: 621. 1954.

Annual herb, the many erect or decumbent viscid-villous stellate-setose stems 2–6 cm. high; stipules scarious, ciliate, 3–4 mm. long, scarcely 1 mm. wide; petioles 1–3 cm. long; leaves suborbicular or broadly ovate, truncate or obtuse at base, 1–2.5 cm. wide, 1–2 cm. long, broadly 3-lobate or irregularly dentate, setose; flowers axillary, solitary from lower leaves or flowers many (Krapovickas), the pedicels 2–5 mm. long; calyx 5 mm. long, setose, the oblong-lanceolate acute lobes about 3.5 mm. long, to 6 mm. in fruit; bractlets 2, borne 0.5–0.9 mm. below the calyx; corolla purple, 5 mm. long or exceeding the sepals by about 1 mm.; stamen tube (stamens about 10) and styles glabrous as the ovate strongly rugose carpels, these 2.5 mm. long.—Apparently allied to *M. pygmaeum* (Remy) Gray, but differing ex char. in its acute calyx-lobes, pedicellate flowers, glabrous fruit; perhaps comparable also to *M. mollendoense* Ulbr. Named for Mrs. R. S. Shepard, who made a collection in the vicinity of Lake Titicaca and Tacna during her missionary work about 1919.

Krapovickas l.c. noted an endoglossum in carpels and chromosome count of 20 as in the similar *U. chilense*. Illustrated, Krapovickas l.c. 617, *fig. 2* (carpel); *pl. 4* (type).

Cajamarca: Chota, *Raimondii 6314*.—Huánuco: near Huánuco, *2040*.—Lima: Matucana, *93*.—Cuzco: Ollantaytambo (*Cook & Gilbert 644*). Urubamba, *Vargas 7887*.—Puno: in meadows *Shepard 123*, type). Bolivia; Argentina.

Malvastrum Stuebelii Hieron. Bot. Jahrb. 21: 318. 1895.

Herbaceous from fusiform root; petioles to 2.5 cm. long; leaves ovate, acutish both ends, irregularly crenate-serrate, hirsute beneath especially on the pinnate nerves, otherwise glabrate, to 3.5 cm. long, 2 cm. wide; peduncles 1-flowered, hirsute, to 2 cm. long; bractlets 3, ovate, acuminate, hirsute, 6–7 mm. long, 2.5–3 mm. wide; calyx 10–14 mm. long, the hirsute lobes tomentose above; petal claw ciliate, 2.5–3 cm. long, 17 mm. wide; carpels about 18, densely hirsute.—Leaves almost if not quite glabrous above, crenate, calyx densely strigose-tomentose, fruits conspicuously different from *M. parnassiaefolium* (Hill). F.M. Neg. 9325.

Cajamarca: Monte Altura de Santa Ursula (*Stuebel 38*, type).

Malvastrum tenellum (Cav.) Hieron. Bol. Acad. Nac. Córdova 4: 15. 1881. *Malva tenella* Cav. Icon. Pl. 5: 14. *pl. 422, fig. 3*. 1799.

A small annual (to 6 dm. high) with slender weak branching pubescent stems and small subsessile flowers in clusters of 3 in the upper axils; leaves 3-lobed, to 12 mm. broad and long, the petioles somewhat longer; bractlets linear; petals light blue, slightly larger than the calyx; carpels 9; seeds reniform.—Unknown to me unless two or three specimens so determined by Johnston and in this work referred to *M. congestiflorum* actually are referable to the species of Cavanilles; it seems possible that only one species is concerned and doubtful that the flowers are always only 3 in an axil.

Peru (see note above). Chile.

Malvastrum Urbanianum Ulbr. Bot. Jahrb. 42: 119. 1908.

Annual, the many erect or ascending stems becoming a dm. or two long, sparsely stellate pubescent as the persisting subulate-lanceolate stipules (2–3 cm. long); petioles 2–5 (–20) mm. long; leaves rhomboid-semiorbicular, truncate or broadly cuneate at base, rounded at apex, stellate on both sides and densely pilose beneath, the nerves there prominent, the margins crenate; flowers roseate-

white, the inflorescence subcapitate in the axils of the upper leaves; calyx campanulate-tubular, nearly equaling the corolla, about 5 mm. long, the lanceolate-deltoid lobes dilated after anthesis, densely villous especially toward the base; petals oblanceolate, subobtuse, the narrowed base and margins pilose and stellate; stamen tube to 3 mm. long; ovary densely stellate; carpels 2.5 mm. long, 1.5 mm. wide, dorsally pilose; seeds glabrous, foveolate-puncticulate, 1 by 1.5 mm.—Near *M. tenellum* (Cav.) Hieron. but distinguished by the unparted leaves that suggest those of an *Alchemilla* (Ulbrich). Dr. Kearney has kindly informed me of Krapovickas' intended transfer of this species to *Tarasa*.

Puno: Above Cuyocuyo, 3,600 meters, *Weberbauer 927*, type. Limbani, Sandía, *Vargas 1312* (det. Kearney).

Malvastrum Weberbaueri Ulbr. Bot. Jahrb. 42: 115. 1908.

Habit of *M. Englerianum* but leaves both sides densely appressed tomentulose with minute stellulate trichomes, the lobes irregularly incised-serrate, the teeth subapiculate, 2–3 cm. long, 1–3 cm. wide; flowers many, on peduncles 1 cm. long; calyx 9–10 mm. long, the indument minutely stellulate and simple trichomes intermixed, the involucral segments 3, persisting, brownish, two lanceolate with subulate tip, the third about 5 mm. long, subulate-filiform; petals sulphur yellow, 18–20 mm. long, 10–11 mm. wide, connate about 2 mm., pilose below as the stamen tube, this 8 mm. long, antheriferous for 4 mm.; fruit broadly conoid, 7 mm. broad, 5 mm. high, densely tomentose with simple and stellate trichomes; seeds reddish, glabrous, narrowly reniform.—Otherwise like the related species; the overall indument is velvety but there are coarse strigose trichomes on petioles, peduncles, calyces and often on the leaf-nerves beneath, and the carpels are rostrate, the beak 1 mm. long (Hill). Cf. *M. Bakerianum* for *Weberbauer 7338* without fruit referred here by Ulbrich. F.M. Neg. 9328.

Ancash: Above Acros, 3,500 meters, *Weberbauer 2760*, type.

17. NOTOTRICHE Turcz.

Reference: A. W. Hill, Trans. Linn. Soc. ser. 2. Bot. 7: 201–266. 1909.

Characteristically little, or small depressed caespitose or pulvinate shrubs with ligneous subterranean caudex, rarely annuals, the 1-flowered peduncles more or less adnate as the stipules (these rarely wanting) to the petioles. Leaves various, often pinnately or

palmately lobed (rarely entire), incised or dissected, mostly basal, the fusion of the stipules and the petioles forming a sort of vagina. Involucel usually wanting. Calyx usually medially 5-lobed, often stellate-tomentose, and with 5 glanduliferous nectaries at base. Petals 5, obovate or oblong, more or less united. Ovary 5- to many-celled, each cell with 1 ascending ovule. Styles capitate and stigmatose apically. Fruits depressed, the numerous carpels 1-seeded, cusped or beaked, at maturity splitting nearly to base (rarely adhering to seed, Krapovickas), the seeds reniform, compressed.—After Hill in the species descriptions at least in large part. Krapovickas, Bol. Soc. Argent. Bot. 4: 107 et al has given basic chromosome number 5 and noted involucels in some annuals.

The name of Hill is so closely associated with this group that his initials have not been used in the following compilation of his studies. In Peru at least only acaulescent species of *Malvastrum*, nearly always with an involucel, are likely to be confused with any of these little alpine mallows.

Hill's introduction, l.c. 201–214, is interesting and informative; the following key is based primarily on his, which however included in 1909 only 62 species for the entire genus, fewer than known today from Peru only; there are undetermined and apparently undescribed species in herbaria, which it has been impractical for me to include. Collections are still too limited for consideration of probable variability especially as regards characters of pubescence and probably in some cases of leaf-dissection. The key therefore is only suggestive, characters used for expediency or of necessity not being in all cases my expression of their validity; as indicated by the monographer, the main sections of the key, with present knowledge, merge. Hill's listing of the species in Bot. Jahrb. 37: 559. 1906, with reference to Baker, Syn. Malv. 40–43 for the original publication of each under *Malvastrum*, has been accepted by me as valid transfer but in any case, as usual in this work, the page reference to Hill's monograph is cited.

Two names have been omitted: *Sida acaulis* Cav. Icon. 5: 13. *pl. 422. fig. 2*, not *Malvastrum acaule* (Dombey) Gray, not identified by Hill; *M. Cavanillesii* Gray, Bot. U. S. Expl. Exped. 156. 1854, mentioned by Hill, l.c. 260 and from the short diagnosis essentially a nomen nudum.

Annuals; flowers 2–3 (4) mm. long.

Leaves about orbicular, never deeply lobed; carpels minutely birostrate.

Leaves crenate-dentate, loosely tomentose; carpels dehiscent. *N. pusilla.*

Leaves medially 3-lobed, stellate; carpels adhering to seed. *N. sarmentosa.*

Leaves flabellate-reniform or suborbicular, then lobed to base; carpels erostrate.

Leaves broadly 3-parted; carpels dehiscent..... *N. nana.*

Leaves 8–10-incised or -lobed..... *N. pygmaea.*

Perennials, the ligneous caudex often branched; flowers often larger.

Anthers globosely capitate; leaves usually subrotund, palmately or flabellately parted the segments often similarly lobed or incised, less frequently oblong to ovate and pinnate to bipinnate; petals nearly always more or less coalescent at base and rarely if ever longer than 2 cm. (see also *N. lanata*, *N. argylloides*, anthers unknown).—See page 535.

Leaves more or less distinctly longer than wide, about oblong or ovate, sometimes broadly, rarely broadly obovate or subrotund but tending to pinnate or bipinnate or if palmately or flabellately divided the segments (at least shortly) pinnate or bipinnate (more or less clearly).

Leaves glabrous or glabrate at least beneath in age (see also *N. rugosa*, *N. flabelleta*).

Leaf indument nearly or quite absent; petals 5–6 mm. long, tube 1.5–2 mm. long..... *N. salina.*

Leaf indument rather tomentose; flowers (8) 10–20 mm. long or longer, tube (3) 4–8 mm. long.

Calyx densely if finely pubescent; vagina ciliate to sericeous.

Leaves diverse, fertile pinnate, sterile bipinnate. *N. longituba.*

Leaves similar; corolla tube rarely 6 mm. long. *N. Mandoniana.*

Calyx glabrous or nearly unless the lobes (several of the following are similar).

Leaves suboblong or about oblong-lanceolate, rarely linear.

Flowers 10–15 mm. long; carpels long-sericeous.

Leaves linear, 1–3-lobed; vagina ciliate. *N. armeriifolia.*

Leaves suboblong, subpinnate; vagina glabrous or nearly.....*N. longissima.*

Flowers about 2 cm. long; carpels short-stellate below; vagina ciliate.....*N. longirostris.*

Leaves ovate or about ovate; flowers about 2 cm. long or longer; carpel trichomes all long.

Leaves somewhat bipinnate; vagina rarely glabrous; petals about 2 cm. long, not red.

Vagina as carpels densely stellate-pilose. *N. anthemidifolia.*

Vagina glabrous or ciliate.

Stipules eciliate or nearly; vagina glabrous; carpels as leaf margins setulose. *N. aristata.*

Stipules densely ciliate as vagina; carpels also or these sericeous.

Leaf segments many.....*N. sericea.*

Leaf segments few.....*N. acuminata.*

Leaves obscurely or not bipinnate; vagina glabrous; petals red, soon 3–4 cm. long.

Leaves palmately parted; calyx tomentose within. *N. purpurascens.*

Leaves pinnatifid; calyx glabrous within. *N. Vargasii.*

Leaves usually densely pubescent at least beneath.

Corolla crimson, 2–2.5 cm. long, tube obsolete; leaves broadly obovate, often glabrate.....*N. flabellata.*

Corolla purple; leaves pubescent both sides. *N. porphyrantha.*

Corolla not red, less than 2 cm. long; tube 3–5 mm. long; leaves not obovate.

Leaves ovate-lanceolate, bipinnate; petals violet, 14 mm. long.....*N. erinacea.*

Leaves subrotund.

Indument tomentose; petals about 18 mm. long.

Indument lax; lobules subovate.....*N. nigrescens.*

Indument close; lobules suboblong.*N. artemisioides.*

Indument minute; petals 7–8 mm. long....*N. rugosa.*

Leaves suborbicular or reniform, rarely broadly obovate, palmately or flabellately parted but the segments similarly lobulate (more or less clearly) rarely unevenly; some species, as observed by Hill, seemingly connect this with some of the species of the previous group.

Leaves medially or submedially lobed, often broadly, lobes few to (rarely) many, frequently with one to several lateral or basal lobules, rarely many-lobulate apically.

Flowers about 1.5–2.5 cm. long.

Petals scarlet or red.

Leaves tomentose.....*N. lanata, N. flabellata.*

Leaves glabrous.....*N. cupuliforme.*

Petals never red.

Leaves glabrous or nearly on one side, unless the lobules.

Leaf-lobes 3–5, medial, somewhat laterally lobulate; indument sparse below.
N. sajamensis, N. condensata.

Leaf-lobes as lobules often many, latter narrow or basally broad; indument often lacking below.

Lobes broad, laterally lobulate.....*N. obcuneata.*

Lobes not or little lobulate laterally, rather, apically.

Lobules many; stipules narrow; indument soft.
N. ticsanica, N. sajamensis.

Lobules few; stipules oblong; indument indurate in age.....*N. aretioides.*

Leaves densely pubescent unless in age both sides.

Lobules dissimilar, partly lateral; indument short or lax.

Primary lobes many.....*N. famatinensis.*

Primary lobes 3–5.

Indument minute, close.....*N. obtusa.*

Indument coarse, lax.....*N. nigrescens.*

Lobules similar, terminal; indument long, soft.
N. borussica.

Flowers usually less than 10 mm. long.

Leaves densely pubescent both sides.

Calyx about 8 mm. long; leaves often 6–9 mm. wide.
Stipules not developed.....*N. estipulata.*
Stipules well developed.
N. candaravica, N. holoserica.
Calyx 4–5 mm. long; leaves about 4 mm. wide.
Leaves suborbicular; stipules ovate....*N. Azorella.*
Leaves rhombic-obovate; stipules filiform.
N. congesta.
Leaves glabrous or glabrate beneath.
Flowers never red.
Leaf-lobes broad, with many minute lateral lobulae.
N. ulophylla.
Leaf-lobes about oblong, with few if any lateral lobulae.
Lobes terminally multilobulate; flowers yellowish.
N. sajamensis.
Lobes few-lobulate or blades deeply 6–9-crenate; flowers white or lilac.
Stipules glabrous or nearly; plants glutinous.
N. foetida.
Stipules stellate at least marginally.
Leaf lobules 5–9; vagina trichomes hirsute-stellate.....*N. obcuneata, N. glacialis.*
Leaf lobules 3–4; vagina trichomes subspinose in age.....*N. aretioides.*
Flowers scarlet.....*N. coccinea.*

Leaves or (and) lobes basally or subbasally (often multi-) parted (except *N. Staffordae*), sometimes simply or the 3–9 lobes deeply bifid, trifid or more parted, pubescent or rarely less so beneath (except in *N. pedatiloba*, glabrous beneath). *N. sajamensis, N. borrusica, N. holoserica, N. nigrescens* might be sought here.

Calyx lobes entire; primary leaf lobes 3–7.
Stipules broadly oblong, obtuse; lobules often very many.
Lobules numerous.
Leaves glabrous beneath; stipules broadly truncate, glabrous.....*N. pedatiloba.*
Leaves pubescent beneath as the obtuse stipules.
N. turritella.

Lobules about 12.....*N. Meyeni.*

Stipules filiform to linear-lanceolate or linear-oblong.

Primary leaf-lobes 3, elongate, deeply 3–5-parted.

Corolla purple, 10–12 mm. long; tube short. *N. Orbignyana.*

Corolla roseate, 17 mm. long; tube 6 mm. long. *N. dissecta.*

Primary leaf-lobes digituliform or 5–7.

Flowers 1 cm. long, white.....*N. pellicea.*

Flowers about 1.5 cm. long.

Lobules digituliform, elongate....*N. digitulifolia.*

Lobules inflexed, short.....*N. alternata.*

Calyx trifid; primary lobes 9, 5-lobulate.....*N. Staffordae.*

Anthers disposed cylindrically in an oblong head, rarely slightly long-obovoid but longer than thick; leaves in general ovate or obovate, rarely linear, entire or subentire, rarely to subrotund but the 3–7 segments tending to pinnate lobulation; petals free or nearly except *N. argentea*, commonly longer than 2 cm. See also *N. flabellata.*

Indument lacking or much less dense on leaves beneath.

Petals red, narrow; leaf indument velvety.

Leaf segments few, acute.....*N. stenopetala.*

Leaf segments many, obtuse.....*N. epileuca.*

Petals never red, obovate; leaf indument rarely velvety.

Leaves linear, entire or shortly 1–2-lobed or fertile; simply pinnate with few short lobes.....*N. gracilens.*

Leaves all much cleft or lobed, all wider than linear.

Flowers 3–3.5 cm. long at least typically.

Stipules tomentose; leaves lanate above.*N. Macleanii.*

Stipules glabrous; leaves velvety above. *N. pichinchensis.*

Flowers to 2 (2.5) cm. long.

Leaves longer than wide.

Indument tomentose; calyx pubescent.

Calyx lanate; leaves ovate-oblong, palmately to subbipinnately parted.....*N. Matthewsii.*

Calyx sparsely stellate; leaves oblong-lanceolate, bipinnate.....*N. Pearcei.*

Indument pulverulent; calyx tube glabrous. *N. argylloides.*

Leaves suborbicular..... *N. phyllanthos.*

Indument dense, about equal on both surfaces.

Flowers about 2.5 cm. long.

Leaf segments multilobulate.... *N. Herrerae, N. sulphurea.*

Leaf segments 3–5- or few-parted.

Indument very short-tomentulose..... *N. Castelnaeana.*

Indument long-sericeous..... *N. argentea.*

Flowers about 15–18 mm. long.

Indument tomentose.

Leaves trifid, lobes trifid and lobulate.. *N. artemisioides.*

Leaves 3–7-parted, lobes crisply multilobulate. *N. pedicularifolia.*

Indument lanate..... *N. lanata.*

Nototriche acuminata Hill, Trans. Linn. Soc. ser. 2. Bot. 7: 258. 1909.

Depressed, caespitose, the ashy sericeous rosulate leaves with petioles 2–3 cm. long, the stipules adnate to below the middle and with the membranous vagina 4–5 mm. wide, the free part linear-lanceolate, acute, 5 mm. long, sericeo-ciliate above; leaves triangular or cordate, 10–12 mm. long and broad, glabrous beneath, bipinnate, the lowest segments 3–5-lobed, the upper 3-lobed or entire, the lobes obtuse; flowers from below the middle of the petioles; calyx 7–9 mm. long, glabrous or the triangular acuminate lobes with a few sericeous trichomes; corolla rose-colored, 17–20 mm. long, the obovate retuse petals coalescent into a tube 5–6 mm. long; stamens in a globose head, the free filaments elongate; carpels 3 mm. long, shortly beaked, dorsally ciliate.

Ayacucho: Andes of Ayacucho, 3,600–4,000 meters (*Pearce*, type).—Puno: Cordillera de Puno (*Lechler 1713*).

Nototriche alternata Hill, Trans. Linn. Soc. ser. 2. Bot. 7: 241. 1909.

Pulvinate, the leaves borne as in the related *N. turritella* but the petioles (8–10 mm. long) dilated to a broad flattened cuneate expansion merging into the flabellate 7-parted leaf-blade, this 6–7 mm. wide, above densely below sparsely stellate tomentose, the

subentire or 3–5-parted segments 1.5–2.5 mm. long, the linear-obtuse lobes inflexed and glabrous apically; flowers slightly above the petiole base; calyx about 1 cm. long, tube subglabrous, subacute lobes 4 mm. long, stellulate; corolla about 1.5 cm. long, obovate petals to 5 mm. wide the basal tube 5 mm. long; carpels lignose, 8 mm. long, stellate-hirsute, the beaks 3 mm. long.—Remarkable for the large carpels but mature ones unknown for *N. sajamensis* and *N. Meyeni*, with which species, and *N. obcuneata*, it grows, judging from the mixture of Stübel's types at Berlin (Hill).

Ayacucho: Near Cangrao, Prov. Huanta, *Raimondi* (det. Ulbrich).—Tacna: Volcano Tacora, 4,200 meters (*Stübel, 108 packet 2*, type).

Nototriche anthemidifolia (Remy) Hill, Bot. Jahrb. 37: 579. 1906; 254. *Sida anthemidifolia* Remy, Ann. Sci. Nat. sér. 3. 6: 356. 1846. *Malvastrum anthemidifolium* (Remy) Gray, Bot. U. S. Expl. Exped. 152. 1854. *N. discolor* Turcz. Bull. Soc. Nat. Mosc. 36, pt. 1: 567. 1863. *N. cheilanthifolia* Turcz. l.c.

Depressed, the caudex branched, the rosulate leaves with petioles 2 cm. long, stipules adnate below the middle, the membranous free part 7 mm. long, filiform, acute, and as vagina glabrous dorsally, densely setose-ciliate marginally; petioles sulcate above the stipules, glabrate; leaves ovate or ovate-oblong, pinnate or bipinnate, 1–2 cm. long, stellate-tomentose above, subglabrous beneath, the short lacinulae obtuse, entire or trifid, ciliate at tip; flowers from below the middle of the petioles; calyx 6 mm. long, tube glabrous, lobes sparsely stellate, acute; corolla rose-colored, 10–12 mm. long, the broadly obovate petals truncate or retuse, the tube 3 mm. long; carpels 8–12, 3.5–4 mm. long, sericeous pilose dorsally, the trichomes 6 mm. long, the beaks subulate 2 mm. long; seeds rugose (Weddell specimens). F.M. Negs. 35502; 35504. Illustrated, Hill, l.c. *pl. 27, fig. 8* (plant); *pl. 30, fig. 1* (flower and stipules), *figs. 31, 32* (carpel and seed).

Arequipa: Near Puno (*Weddell 4446*).—Tacna: Tacora (*Weddell; Steinmann*). To Argentina.

Nototriche aretioides (Gray) Hill, Bot. Jahrb. 37: 580. 1906; 231. *Malvastrum aretioides* Gray, Bot. U. S. Expl. Exped. 1: 153. 1854.

Depressed, caespitose, pulvinate, the caudex often much branched; stipules adnate to above the middle of the petioles (6–15 mm.

long), the free part oblong, 3 mm. long, densely stellate, the broad membranous vagina armed dorsally with subspinose stellate trichomes; leaves semicircular, trifid, 3 mm. long, 8 mm. wide, densely and finely stellate-tomentose above, glabrous beneath with 3–4 obovate obtuse lobules; flowers subsessile, about middle of petiole; calyx acutely lobed nearly to middle, 7 mm. long, lobes sparsely tomentose, hirsute within and marginally; corolla blue-lilac, 1.5 cm. long; petals broadly obovate, emarginate, connate for 4 mm.; carpels 7–8, subulate-rostrate, dorsally long-sericeo-ciliate.—Illustrated, Hill, l.c. *pl. 29, figs. 15, 16* (leaves).

Lima: Cosmopolia, *832* (det. Johnston). Casa Cancha (*Pickering,* type).—Junín: Arapa Hacienda near Yauli, 4,400 meters, *Weberbauer 289;* 221. Cerro de Pasco, *3063* (det. Ulbrich). Huarón, *1152* (det. Johnston).—Cuzco: Valle del Paucartambo, 3,700 meters (*Herrera 103*). "Panti-thurpa" (Herrera).

Nototriche argentea Hill, Bot. Jahrb. 37: 585. 1906; 259.

Silvery even to the calyces with a sericeous tomentose indument, depressed, caespitose; petioles 2–3.5 cm. long; stipules adnate to the vagina 6 mm. long the free part subulate 8 mm. long, dorsally glabrous; leaves broadly ovate or pentagonous, ternate or somewhat 5-parted, 2–2.5 cm. long, about 2 cm. wide, less densely sericeous beneath, the laciniae of the bipinnatifid segments spathulate, crenate, to 3 mm. long, 1–1.5 mm. wide; flowers inserted below the middle of the petioles, subsessile; calyx 11–12 mm. long, the lobes narrowly triangular, acute; corolla white or pale lilac, 2–2.5 cm. long, the obovate retuse petals connate into a tube 3.5 mm. long; stamens in an oblong head; carpels dorsally sericeous, long-biaristate (immature).—F.M. Neg. 9339. Illustrated, Hill, l.c. *pl. 29, fig. 1* (leaf and flower).

Ancash: Above Huaraz, 4,400 meters, *Weberbauer 3103,* type; 226. Across to Chonta, *Weberbauer 2777;* 224.—Tacna: Candarave, sandy tola heath, *Weberbauer 7373* (det. Ulbrich).

Nototriche argylloides Hill, Trans. Linn. Soc. ser. 2. Bot. 7: 245. 1909.

Depressed, caespitose; leaves rosulate; petioles 2–4 cm. long, stipules adnate above the middle, the free part membranous, linear-lanceolate, acute, to 1 cm. long, glabrous or marginally very sparsely stellate; leaves various, pentagonous to more or less ovate, palmately lobed or parted, 10–18 mm. long, 8–12 mm. wide, the segments

multilobed or somewhat bipinnatifid, incised-crenate, often crisped, the medial the largest, ashy puberulent-tomentulose above, medially glabrous beneath; flowers about the middle of the petiole between the stipules; calyx 6–9 mm. long, acute lobes 2–3 mm. long, tomentulose both sides, the tube glabrous; corolla roseate or rose-violet, 18–20 mm. long, petals broadly obovate, the tube 5 mm. long; carpels about ten, 7.5 mm. long, beaks 2 mm. long, densely stellate-ciliate.—Petioles and calyces suffused with reddish-purple the latter with conspicuous pink-purple veins. Illustrated, Hill, l.c. *pl. 27, figs. 6, 7* (plants); *pl. 30, figs. 18, 27* (carpels).

Arequipa: Puno to Arequipa, *Weddell 4394*. Vincocaya, 4,376 meters (*Hill 80*, type; *Copeland*).

Nototriche aristata Hill, Trans. Linn. Soc. ser. 2. Bot. 7: 255. 1909.

Depressed, the caudex branched, the rosulate leaves with petioles 2 cm. long, stipules adnate above the middle, the vagina 5 mm. wide, the free part basally subulate, acute, 5 mm. long, all glabrous except for the sparsely setose-ciliate margins; leaves more or less ovate-elliptic, 10–18 mm. long, densely stellate-tomentose above, glabrous below, palmately or subpinnately parted, the segments rather crowded, entire or 3–7-cleft, the linear-oblong obtuse lacinulae 3–4 mm. long, ciliate apically; flowers at middle of petioles; calyx 10 mm. long, very sparsely ciliate without, the triangular acute lobes stellate-ciliate within; corolla rose-violet, 16–18 mm. long, the concave spathulate obovate petals coalescent into tube 4–5 mm. long; stamens few, borne in a globose head; carpels 8–12, 8–9 mm. long, dorsally setose-ciliate, the subulate beaks 4–5 mm. long.—Like a large form of *N. longirostris* but the larger carpels setulose instead of short-stellate, the longer beaks with stiff bristles (Hill). It seems to be *N. longissima* except for the long softer pubescence of the carpels, more ovate leaves. Illustrated, Hill, l.c. *pl. 30, figs. 25, 26* (carpels).

Cuzco: Pacechac Valley near Urubamba, 4,500 meters (*Hill 76; 77*, type).

Nototriche armeriifolia Hill, Kew Bull. 160. 1935.

Depressed, caespitose, pulvinate, with ligneous branched subterranean caudex; stipules adnate to the petiole and with it forming a quasi vagina (3–3.5 mm. wide, 8–10 mm. long), the lanceolate free part 1.5–2 mm. long, densely hirsute (dorsally glabrous) as the

petioles with whitish stellate trichomes 3 mm. long; leaves linear, 1.5 cm. long, about 1 mm. wide, marginally incurved, with 1 or 2, rarely 3 linear lobes about 2 mm. long, 5 (or so) mm. below the tip, densely stellate velutinous-hirsute above, glabrous beneath; flowers borne a little below the middle of the petioles; calyx nearly medially 5-lobed, 7.5 mm. long, nearly glabrous, the acute lobes with a few long trichomes, within at base with 5 papillose glands and long-pilose; corolla pale violet, 13–14 mm. long, the basally obovate-cuneate petals 4 mm. wide, coalescent at base into tube 4 mm. long; anthers many, globosely capitate; carpels 1.75 mm. long, beaks 0.5–0.75 mm. long, dorsally covered with trichomes 3–4 mm. long.

Puno: Valley below Cunurana Range, Santa Rosa de Ayaviri to Sicuani (*Stafford 362*, type, Herb. Kew).

Nototriche artemisioides Hill, Bot. Jahrb. 37: 580. 1906; 228.

Depressed, caespitose, often pulvinate; petioles 1.5 cm. long, the medially adnate stipules both sides as leaves and calyx lobes without densely stellate-tomentose; free part of stipules linear, acute, 6–9 mm. long; leaves rotund-cordate, trifid, 1 cm. long, 12 mm. wide, the segments 3-lobed, the lobules 2–3-lacinulate; flowers subsessile, borne below the middle of the petiole; calyx 12 mm. long, the linear-lanceolate subacute lobes 8 mm. long; corolla less than 2 cm. long, the violet obovate petals retuse, connate for 5 mm.; carpels 7 mm. long, biaristate (beaks 3 mm. long), densely stellate-hirsute dorsally and ventrally, the seeds sulcate dorsally.—Stamens relatively few in a somewhat elongate head (Hill). *N. Lobbii* (Baker) Hill, 228, *pl. 28, fig. 8* (leaf), origin unknown, ex char. is similar but branching, the primary leaf segments petiolate, more lacinulate, petals 2 mm. connate. Illustrated, Hill l.c., *pl. 28, fig. 6* (leaf with flower). F.M. Neg. 9340.

Cajamarca: Grass steppes near Hualgayoc, 3,400 meters, *Weberbauer 4068*, type; 271.

Nototriche Azorella Hill, Bot. Jahrb. 37: 582. 1906; 219.

Densely caespitose, pulvinate, with much branched ligneous subterranean caudex; leaves numerous, congested, imbricate, densely condensed in small cylinders; petioles 5 mm. long; stipules adnate nearly to the leaf-blades, the resulting vagina membranous, 3–4 mm. wide, the free part somewhat herbaceous, oblong, acute, 2 mm. long, the face glabrous as the vagina but dorsally and marginally densely stellate-ciliate or setose; leaves semicircular or orbicular, 5–7-

flabellately divided, 3 mm. long, 4 mm. wide, densely stellate-tomentose both sides, the segments entire or 3–5-crenate-lobed the medial one often 5-lobate; flowers below the middle of the petioles; calyx 5 mm. long, subacute lobes 1 mm. long, stellate without, glabrous within; corolla roseate-white, 7 mm. long, the petals nearly truncate, coalescent into hirsute tube 2.5 mm. long; stamens about 14, the head exserted; pistils and carpels unknown.—With *N. congesta* the two smallest perennial species; they both form hard cushions, due to the density of the rather vertical caudex branches, like those of the genus *Azorella*, sometimes 1 dm. across; the dense cylinders are about 1 cm. across, only the upper leaves living, and the center of each tiny rosette is occupied by a flower (Hill). Illustrated, Hill, l.c. *pl. 27, fig. 3* (plant); *pl. 28, fig. 15* (leaf and flower).

Puno: Poto to Ananca, Prov. Sandía, 4,600 meters, *Weberbauer 957*, type; 219.—Tacna: In small ravines in shelter of boulders, 5,100 meters, Volcan Tatora, *Werdermann 1152; 1477* (det. Ulbrich). Chile.

Nototriche borussica (Meyen) Hill, Bot. Jahrb. 37: 579. 1906; 236. *Sida borussica* Meyen ex Walp. Nov. Act. Acad. Leop.-Carol. 19: Suppl. 1: 308. 1843.

Depressed, caespitose, the silvery tomentose leaves hemispherically congested; stipules adnate to 2 mm. below the middle of the petioles (these 1 cm. long) the subulate free part 3 mm. long; vagina dorsally and petioles with sides minutely stellulate-tomentose; leaves reniform, flabellately and deeply 5–7-parted, 3–4 mm. long, 7 mm. wide, segments 3–5-lobed, lobes cuneate, softly stellate both sides; flowers from below middle of petioles; calyx 9 mm. long, ovate lobes obtuse, velutinous stellate both sides; corolla about 1.5 cm. long, white with dark violet or almost black stripes.—Meyen mentioned the species first in his Reise um die Erde 2: 31 and explained his choice of name from the resemblance of the color of the flowers to those of the flag of Prussia. Easily known by its long free petioles, soft white tomentum, and cuneate leaf-lobes (Hill). F.M. Neg. 32637.

Arequipa: Vulcan El Misti, Alto de los Huesos, in black volcanic ash, 3,800 meters (*Meyen*, type).—Tacna: Tacora, 4,670 meters, *Meyen*.

Nototriche candaravica Ulbr. Notizbl. Bot. Gart. Berlin 11: 531. 1932.

Pulvinate, the rhizome 4–6 mm. thick, the leaves very densely rosulate at the tips of the erect branches; petioles 5–7 mm. long, stipules (free part) oblong-lanceolate, about 3 mm. long, sparsely villous; leaves cuneately suborbicular, deeply multilobulate, 2.5–3 mm. long, yellowish villous-stellate; flowers subsessile on pedicels 1.5 mm. long; calyx 7–8 mm. long; corolla violet, whitish toward villous base, the tube 1.5–2 mm. long; petals oblong, nearly 8 mm. long; stamen tube 5 mm. long; stamens in a globose head, the filaments elongate.—Related to *N. nigrescens* with much larger leaves and flowers; the polsters formed by the branches and leaves are 1–2 cm. high, 1.5–3 cm. across, and the stamens are in an oblong-cylindrical head (Ulbrich). It seems to be very near *N. holoserica* but the leaves shorter in type (young).

Tacna: Tola heath, Candarave, 4,000 meters, *Weberbauer 7372*, type.

Nototriche Castelnaeana (Wedd.) Hill, Bot. Jahrb. 37: 579. 1906; 257. *Malvastrum Castelnaeanum* Wedd. Chlor. And. 2: 283, *pl. 80A*. 1857.

Caespitose, canescent-tomentose, the naked caudex simple or sparsely branched; petioles little dilated; leaves pinnatisected, 1–2 cm. long, with 4–6 3–5-parted segments the lower the larger, the lacinulae obtuse, plane, velvety stellate-tomentose both sides; flowers sessile, between the setaceous stipules at or a little below the middle of petioles; calyx campanulate, about 9 mm. long, softly tomentose, the lobes triangular-lanceolate; petals about 2 cm. long, scarcely emarginate; anthers in an oblong-cylindrical head.—Imperfectly known. F.M. Neg. 35503.

Cuzco: Cordillera de Cuzco, *Castelnau*, type. Without locality, *Maclean; Ruiz & Pavón.*

Nototriche coccinea Hill, Bot. Jahrb. 37: 583. 1906; 219.

Caespitose, pulvinate, the caudex densely branched; petioles 1–1.5 cm. long, the stipules adnate to above the middle, free part as vagina membranous, linear, subacute, 4–5 mm. long, with the petioles little tomentose, dorsally glabrous, marginally stellate-pilose; leaves reniform, 5-lobate, 6 mm. long, 9 mm. wide, stellate-tomentose above, nearly glabrous beneath, the lobes 3–5-lobulate, the lobules broadly obovate-crenate; flowers below the middle of the petioles; calyx 7–8 mm. long, tube glabrous, subovate acute lobes stellate-pilose without; corolla scarlet, 1 cm. long, petals irregularly

emarginate, tube about 3 mm. long; carpels 8.5 mm. long, stellate-hirsute dorsally, beaks 1 mm. long; seeds sulcate.—Branches slender, forming a compact cushion, the root system much divided (Hill). Illustrated, Hill, l.c. *pl. 30, fig. 17* (carpel).

Ancash: Above Lake Yanganucos above Yungay, 4,600 meters, *Weberbauer 3276*, type; 226.

Nototriche condensata (Bak. f.) Hill, Bot. Jahrb. 37: 579. 1906; 224. *Malvastrum condensatum* Bak. f. Journ. Bot. 29: 363. 1891.

Depressed, caespitose, pulvinate, with stout branching caudex; petioles to 2 cm. long; stipules adnate to about the middle of the petiole, with it forming a membranous vagina 3–4 mm. broad, the linear acute free part about 1 cm. long, as the petiole glabrous dorsally, sparsely stellate marginally; leaf-blades broadly obcuneate or flabelliform, more than medially 5–7-parted, to 1 cm. long, 10–12 mm. wide, densely ashy-stellate-tomentose above, sparsely so or nearly glabrous beneath, the medial segments 3–5-lobed; flowers borne a little below the middle of the petiole; calyx about 8–13 mm. long, more or less densely stellate-tomentose, the subacute ovate lobes tomentose marginally; corolla dark blue, 2.5 cm. long, the obovate-oblong petals coalescent into a tube only 1–2 mm. long; stamens forming a globose head, the free portions of the filaments elongate; carpels 10–12, 7 mm. long, dorsally stellate below, the beaks stellate-ciliate, 3 mm. long.—The leaf resembles the palm of a hand, with finger-like lobes, some of which bear minute incurved lateral lobulae (Hill). Baker described the petals as only 8 mm. long, perhaps from not fully developed flowers, while Weddell referred the type to *N. phyllanthos*. Conceivably the species when better known may be found to include *N. sajamensis*, *N. ticsanica* and *N. pulvinata* Hill, Kew Bull. 18. 1928 of northern Chile, as it does not seem probable that the differences in pubescence-distribution, leaf-division and size described for these plants are really specific factors.

Puno: Near Ayapata, *Lechler 1972*, type, Herb. Kew; same number, part, Herb. Paris.

Nototriche congesta Hill, Bot. Jahrb. 37: 582. 1906; 221.

Habit of the similar *N. Azorella;* petioles 6–7 mm. long; vagina 2–3 mm. wide; stipules filiform-subulate, acute, 2–3 mm. long, glabrate as vagina except stellate dorsally and marginally; leaves

more or less rhombic or broadly obovate, acute, 5-parted medially, about 4 mm. long and wide, somewhat stellate-tomentose both sides, the middle segments shortly 3-lobate, the lateral inflexed; corolla 6 mm. long, petals more or less retuse, tube 1.5 mm. long.—Otherwise like the related species; the leaves form a larger and less dense mass; branches above covered with dead leaves, below only the vaginae remain, these with bristle-like trichomes; large orange-colored glandular nectaries at calyx base (Hill). Illustrated, Hill, l.c. *pl. 30, fig. 3* (glandular petals). F.M. Neg. 9344.

Puno: Suchez, Prov. Sandía, 4,500 meters, *Weberbauer 1018*, type; 219.

Nototriche cupuliforme Krap. Bol. Soc. Argent. Bot. 5: 71. 1953.

Depressed, essentially glabrous, sometimes 4 cm. across, the ligneous caudex a cm. in diameter, and unique in flower-structure, the wine red corolla with the segments borne below a cupuliform extension of the corolla-tube; stipular vagina 1.5 cm. long, 2.5 mm. wide at base, 1.5 mm. wide at apex, the triangular-lanceolate free portion 3–4 mm. long, about 1 mm. wide; leaves palmately nerved, 7-parted, the subequal subacute divisions sometimes uniciliate at tip; flowers solitary at the free part of the stipules; calyx 5 mm. long, teeth 2.5 mm. long, 2 mm. wide, with a few simple or stellate trichomes at the margins; corolla glabrous, about 9 mm. long, the tube 1.5 mm. long by 2 mm. wide, extended about 1 mm. above the base of the obovate petals; anthers and stigmas (6) globosely congested; carpels 1-ovulate, glabrous or nearly.—The remarkable extension of the tubular union of the corolla segments is unique (author). Illustrated, l.c. 69, *fig. 6, c, d, f* (leaf, corolla).

Puno: Pampa de Lacka, Prov. Carabaya, 4,360 meters, (*Vargas 7119*, type).

Nototriche digitulifolia Hill, Kew Bull. 127. 1948.

Depressed, caespitose, the polsters 2–4 cm. wide; caudex more than 1.5 dm. long; leaves crowded, white pubescent; petioles 12 mm. long, long-stellate above the stipules; stipules medially connate, the resulting vagina membranous, only dorsally and marginally long stellate-tomentose, the free part linear-lanceolate, 8–9 mm. long; lobules 7, dissected to base into erect spathulate segments 1.3–5 mm. long; flowers at middle of petioles; calyx 1 cm. long, the narrow acute lobes strigose-stellate, the tube glabrous; corolla tube 3 mm.

long, stellate pilose, the obovate lobes 12 mm. long; anthers in globose head; carpels 6 mm. long, beaks 2.75 mm. long, densely stellate.—Allied to *N. pedatiloba* Hill but stipules narrower, leaf-segments finger-form, calyx lobes longer, corolla tube shorter (Hill). Illustrated, Hill, l.c. 126.

Puno: San Antonio de Esquilache, 4,500 meters (*Stafford 765*, type).

Nototriche dissecta Hill, Trans. Linn. Soc. ser. 2. Bot. 7: 238. 1909.

Pulvinate, the hemispherical leaf-rosettes about 4 cm. across, the petioles, these 1 cm. long, stipules and leaves lanately stellate-tomentose; stipules adnate above the middle, the free part herbaceous, linear, acute, 8–9 mm. long; leaf blades semicircular, deeply trifid, 6 mm. long, about twice as wide, the segments equally biternate, 2–7-lobate, the linear-oblong lobes subacute; flowers shortly pedicellate at the middle of the petioles; calyx lanate, 8–9 mm. long, the narrowly triangular lobes acute; corolla rose colored, 17 mm. long, the oblong-obovate subtruncate petals coalescent into tube 6 mm. long.—The tomentum of long stiff bristles and the three main segments of equal size are distinctive characters (Hill). Illustrated, Hill, l.c. *pl. 28, fig. 13* (leaf).

Apurímac: Andahuaylas, 3,900–4,300 meters (*Pearce*, type).

Nototriche epileuca Hill, Bot. Jahrb. 37: 585. 1906; 252.

Depressed, caespitose, the laxly rosulate leaves white-covered; petioles 3–4 mm. long, glabrous as the medially adnate stipules, their free part linear, acute, 5 mm. long; leaves triangular, trifid, white-tomentose above, glabrous beneath, segments pinnatifid, lobes deeply 3-cleft, the somewhat involute laciniae crenate; flowers subsessile; calyx 10–11 mm. long, lobes 6–7 mm. long, linear-lanceolate, subacute, sparsely stellate puberulent without, tomentose within; corolla blood-red, 2.5 cm. long, its obovate-oblong petals retuse, adnate at base to staminal tube; carpels about 20, 8 mm. long, each with 2 broad stellate beaks 4 mm. long, dorsally stellate.—Petals practically free, stamens in an oblong head; resembles *N. stenopetala* but the leaf-segments many and obtuse instead of few and acute (Hill). Illustrated, Hill, l.c. *pl. 30, fig. 28* (carpel). F.M. Neg. 9345.

Ancash: Across to Chonta, 4,400 meters, *Weberbauer 2801*, type; 224.

Nototriche erinacea Hill, Kew Bull. 127. 1948.

Caudex stout, sparsely branched, crowned by rosettes 1 dm. wide or wider, the leaves to 7 cm. long, densely stellate-tomentose (drying flavescent); petioles 3–4 cm. long, free part of stipules linear, acute, 1.5 cm. long, adnate part with vagina 2–3 cm. long, stellate; leaf blades ovate-lanceolate, 2.5–3 cm. long, 2 cm. wide, bipinnatifid, the primary segments 5 each side, the medial 2–2.8 cm. long, bipinnate with crenate lobules, the terminal ones rounded, the lateral oblongish, acute; flowers violet, subsessile among the stipules; calyx 17 mm. long, tube 7 mm. long, lobes 1 cm. long, narrowly triangular, stellate-tomentose without, strigose within; corolla tube 3 mm. long, sparsely pubescent or glabrous, petals narrowly obovate, 11 mm. long, 6 mm. wide; anthers in globose head; carpels 1 cm. long, beaks 5 mm. long, dorsally sericeous with trichomes 5 mm. long.—Similar to *N. sulphurea* but leaves and flowers smaller, some calyx trichomes stoutly stipitate, corolla tube longer, petals not tomentose, carpels long-rostrate (Hill). Illustrated, Hill, l.c.

Puno: San Antonio de Esquilache, 4,500 meters, stony slopes (*Stafford 758*, type).

Nototriche estipulata Hill, Kew Bull. 128. 1948.

Caudex stout, to 1.5 dm. long, the densely crowded estipulate leaves forming an oblong-ovoid head at the top; petioles about 1 cm. long, subglabrous above, margins and beneath stellate-pilose; leaf blades 3 mm. long, 6 mm. wide, with about 9 short obtuse fleshy lobules stellate-pilose both sides; flowers subsessile, 2 mm. above base of petioles; calyx 8 mm. long, stellate-pilose, the tube 5–6 mm. long, lobes fleshy at tip; corolla tube stellate-pilose, 4.5 mm. long, suboblique obovate lobes 3–4 mm. long; anther head globose; carpels (immature) long-sericeous dorsally and on beaks, stellate-pilose toward the base.—Affine *N. famatinensis* Hill of Argentina with stipules and especially *N. compacta* (Gay) Hill of Chile but leaves less lobate, corollas larger, indument longer and laxer (author). Illustrated, Hill, l.c.

Tacna: Volcan Tacora, 4,800 meters, *Werdermann 1401*, type.

Nototriche famatinensis [Hieron.] Hill, Bot. Jahrb. 37: 581. 1906; 227.

Pulvinate from caudex, to 2 cm. thick; petioles more or less tomentose, 1–2 cm. long; stipules more than medially adnate, subulate free part to 1 cm. long, above and marginally stellate-

pilose; leaves semicircular, flabellately to middle 7–11-lobate, 6 mm. long, 11 mm. wide, above densely, beneath sparsely stellate-tomentose, lobes entire to 9-lobulate, the medial 3-lobulate, the others laterally 1-lobulate; flowers sessile at middle of petioles; calyx about 8 mm. long, the lobes narrowly ovate, acute, stellate-tomentose, nearly glabrous within; corolla 7–9 mm. long, tube 2–3 mm. long; carpels shortly birostrate, dorsally ciliate.—As elsewhere in this work the author's name in brackets indicates that it was unpublished, unless in synonymy. Illustrated, Hill, l.c. *pl. 28, fig. 7* (leaf). F.M. Neg. 9346.

Tacna: Volcan Tacora, 4,800 meters, *Werdermann 1401* (det. Ulbrich). Western Argentina.

Nototriche flabellata (Wedd.) Hill, Trans. Linn. Soc. ser. 2. Bot. 7: 222. 1909. *Malvastrum flabellatum* Wedd. Chlor. And. 2: 281. 1857.

Depressed, caespitose, velvety-tomentose; petioles 2–4 cm. long; free part of vagina membranous, linear-subulate, acute, 1 cm. long, densely floccose-stellate as the petioles; leaf blades broadly obovate-cuneate to rounded, flabellately 5- or 7-parted, about 1.5 cm. long, 12–15 mm. wide, floccose-stellate both sides or glabrate beneath, the lateral segments obovate-cuneate, 5–7, unequally incised-crenate, the middle segment more or less trifid, the lobes incised-crenate; flowers from nearly the middle of the petiole; calyx 18 mm. long, the triangular-acute lobes glabrous within; corolla puniceous, (1) 2–2.5 cm. long, the oblong, irregularly retuse petals 7 mm. wide, scarcely coalescent; stamen column about 2.7 cm. long; carpels 9 mm. long, dorsally stellate, the beaks about 5 mm. long (*Lechler 1972*, in part), carpels nearly mature 7.5 mm. long, stellate below, stellate ciliate above, the beaks about 2.5 mm. long (Weberbauer). —The Herrera determination has been questioned in herb. by Killip, perhaps with reason since D'Orbigny's specimen from La Paz (perhaps the true type) was thought to have small flowers; this is discussed by Hill; the anthers, too, as here defined are long-filamentose and more oblong than globose in disposition. F.M. Neg. 23745 (Mandon). Illustrated, Hill, l.c., *pl. 29, fig. 2* (leaf and calyx); *pl. 30, figs. 7, 8* (flowers), *fig. 14* (carpel).

Cuzco: Pachatusán, *Herrera 2574*, pt. (det. Ulbrich).—Puno: Near Ayapata, *Lechler 1972*, pt. Poto to Anaca, Prov. Sandía, 4,400 meters, *Weberbauer 961*. Adjacent Bolivia.

Nototriche foetida Ulbrich, Notizbl. Bot. Gart. Berlin 11: 530. 1932.

Foetid glutinous rhizomatous perennial, the dense erect columnariform branches forming cushions 2.5–4 cm. high; stipules connate, 3–4 mm. long; petioles sparsely stellate, 5–7 mm. long; leaves cuneately suborbicular, 2–3 mm. long, 3–5 mm. wide, crenately incised, densely white tomentose above, sparsely stellulate or subglabrous beneath; flowers white, subsessile at tips of branches; calyx 8–9 mm. long, the lanceolate-oblong obtusish lobes 2.5–3 mm. long, sparsely stellulate, otherwise glabrous; petals obovate, ciliate toward base, about 8 mm. long; stamen tube cylindrical, 4–5 mm. long, anthers globosely capitate.—Well-marked by the odor and glutinous condition; habit similar to *N. obcuneata* with parted leaves, reddish flowers, and to *N. glacialis*, the flowers opening pale lilac (Ulbrich).

Tacna: Tola heath, Candarave, 4,500 meters, *Weberbauer 7361*, type.

Nototriche glacialis Ulbr. Bot. Jahrb. 54: Beibl. 117: 62. 1916.

Similar to *N. obcuneata* (fide author) but with much slenderer longer rhizomes; petioles about 8 mm. long, the free part of stipules 4–5 mm. long, obtuse, sparsely appressed stellate; leaves broadly obovate, 4–6 mm. long, 6–9 mm. wide, the flabellate lobes sometimes with a few minute stellate trichomes beneath, 6–9-crenate; flowers borne above the middle of the petioles, pale lilac, finally white, 9–10 mm. long; calyx nearly 3 mm. long, sparsely and minutely stellate, glabrous within; petals basally fimbriate, clawed, somewhat retuse; anthers subglobosely capitate, not exserted; ovary stellate-tomentose below, penicillate apically with long sericeous trichomes.—The slender rhizomes are a dm. or two long, the leaves olive-green beneath, the flowers small; type from the base of glacier Cuspicocha, in stone-drift.

Junín: Above Hacienda Acopulca, 4,900 meters, (*Weberbauer 6523*, type).

Nototriche gracilens Killip & Macbr., sp. nov.

N. armeriifoliae similis sed floribus majoribus et imprimis antheris in cylindricam columnam instructis facile distinguenda; petiolis circa 1 cm. longis; vagina vix 1.5 mm. lata glabra ut stipulae parte libera subulato-lineari 3–5 mm. longa; lamina 2–2.5 cm. longa, 1–2 mm. lata integra vel breviter 1–2-lobulato vel laminae

folii fertilis interdum simpliciter pinnatilobata 6–7 mm. lata, lobis circa 3–4 mm. longis, supra dense stellato-tomentosa, subtus glabra; flores subsessiles in petiolo inter stipulas producti; calyx 1 cm. longus, lobis triangularibus acutis solum intus tomentosis; corolla 2–2.5 cm. longa, petala in tubum vix 2 mm. leviter connata fere 10 mm. lata.—The type in the National Herbarium bearing the inscription "probably new," E. P. Killip; I have shared in its publication with my friend's kind permission.

Huancayo: Laguna Huacracocha, 5,000 meters, *Soukup 3604*, type.

Nototriche Herrerae Ulbrich ex Hill, Kew Bull. 129. 1948.

Resembles *N. pedicularifolia* but the leaves 5.5–7 cm. long, densely tomentose, the flowers much larger; stipules about 17 mm. long, linear, stellate-tomentose, the adnate base and vagina 2–3.5 cm. long; petioles 3.7 cm. long, free part 1.7 cm. long; leaf blades ovate, 2.5–3 cm. long, 2.3 cm. wide, 5-lobed, the lobes pinnately multilobulate; flowers between the stipules; calyx tube 7 mm. long, lobes 1 cm. long, acute, stellate-tomentose; corolla large, drying purple with yellowish base, tube 2 mm. long, pubescent, lobes obovate, emarginate, 2.3 cm. long, pubescent within at base; head of anthers long-obovoid; carpels long-sericeous.—Seems, ex char., to be *N. sulphurea*. Illustrated, Hill, l.c.

Cuzco: (*Herrera 3679c*, type, Herb. Kew).

Nototriche holoserica Hill, Kew Bull. 248. 1927.

Pulvinate; petioles 6–8 mm. long; stipules adnate above the middle, the free part filiform or subulate, to 5 mm. long; leaves lanate, stellate-tomentose both sides, semicircular or reniform, about 6 mm. long, 9 mm. wide, multilobulate, the lobes 1.5–2.5 mm. long; flowers shortly pedicellate; calyx 8–9 mm. long, the lobes lanate; corolla blue, about 1 cm. long, the tube 4 mm. long, hirsute without; carpels beaked, stellate-tomentose below.—Like *N. compacta* (Gay) Hill of Chile but sericeous lanate, the leaves multilobulate (Hill).

Cuzco: Valle del Paucartambo, 3,800 meters, (*Herrera 2390*, fide Herrera). "Turpai"(Herrera). Chile.

Nototriche lanata Hill, Trans. Linn. Soc. ser. 2. Bot. 7: 229. 1909.

Habit of *N. flabellata*, but the leaves much more deeply parted, the tomentum more sericeous; leaves rather laxly rosulate; petioles

1.5–2 mm. long; stipules adnate above the middle, the membranous vagina 2–3 mm. broad, the free part subulate, 5–7 mm. long, sparsely stellate or glabrous except for the lanate-stellate margin; leaf-blades almost rotund, 12 mm. long and broad, flabellately 5– or 7–9-parted, above sparsely, beneath densely lanate-stellate, the larger segments cuneate or ovate-cuneate and pinnatifid, the lobes and smaller lateral segments entire, 3-lobulate or incised, with short congested linear obtuse lacinulae; flowers from the middle of the petioles; calyx about 9 mm. long, lanate, the acute lobes tomentose within; corolla rose-violet, 18 mm. long, the broadly obovate retuse petals coalescent into a tube 5 mm. long; carpels about 8, nearly mature 6 mm. long, the broadly subulate beaks 2 mm. long, shortly stellate-pilose.—Type from northeast side of Lake Titicaca. Seems, as suggested by Hill, more or less allied to *N. pedicularifolia*, but the anthers not described. Illustrated, Hill, l.c. *pl. 29, fig. 18* (leaf).

Puno (probably). Adjacent Bolivia.

Nototriche longirostris (Wedd.) Hill, Bot. Jahrb. 37: 579. 1906; 252. *Malvastrum longirostre* Wedd. Chlor. And. 2: 281. 1857.

Depressed, rarely branched, the small plants usually consisting of a single leaf-rosette; petioles to 2 cm. long, the stipules adnate to above the middle, the vagina 4–5 mm. wide, more or less stellate hirsute above, the triangular acutish free part to 5 mm. long, subglabrous beneath, the margins setose-ciliate; leaves oblong-lanceolate, 1–1.5 cm. long; rather laxly stellate-tomentose above (or in age glabrate), glabrescent beneath, bipinnate with 3–4 segments each side, these as the terminal lobe 3–30-parted, the oblong or linear lacinulae often ciliate apically; flowers below the middle of the petioles; calyx campanulate, 8–9 mm. long, tube glabrous, the acute lobes rather setose-stellate, marginally and within tomentose; corolla drying white-violet, 1.5–2 cm. long, the obovate petals scarcely emarginate, their tube 4 mm. long; stamens in a globose head; carpels 6–8, stellate-tomentose below, setulose-ciliolate above, about 7 mm. long, beaks 3 mm. long; seeds sulcate.—The specimens as determined may be found to include segregates which are perhaps only variants, however, when carpels are available, their pubescence may distinguish it from *N. longissima* and *N. aristata*. Illustrated, Solms, Bot. Zeit. 65: 120, *pl. 2, figs. 5, 12;* Hill, l.c. *pl. 30, figs. 22, 23* (carpel and seed); Weberbauer, 202 (plant). F.M. Neg. 23748.

Junín: Morococha, *Raimondi* (det. Ulbrich). La Oroya, *Kalenborn 117* (det. Killip).—Huancayo: Huanacocha, *Soukup 3613* (det.

Killip, *N. longissima*).—Ayacucho: Mt. Razuhuillca, *Weberbauer 7492* (det. Ulbrich, *N. Mandoniana*).—Cuzco: Valle del Paucartambo, 4,400 meters, *Herrera 1012; 2322* (det. Macbride, *N. Mandoniana?*). Andes of Cuzco, *Castelnau*, type; *Gay*. "Turpa" (Herrera). Bolivia.

Nototriche longissima Hill, Bot. Jahrb. 37: 586. 1906; 257.

Caespitose, the caudex little if at all branched, sometimes a dm. long or longer, the oblongish pinnatifid leaves laxly rosulate, petioles to 3.5 cm. long, glabrous as the linear-oblong acute free part of the stipules or these ciliate, 6 mm. long; leaves about 1.5 cm. long, stellate-hirsute above, glabrous below, the segments subentire or 3-cleft, the linear lobes about 4 mm. long or little ciliate at the subacute tips; calyx above the middle of the petioles, about 8 mm. long, the acute lobes glabrous but ciliate within; corolla violet, 1.5 cm. long, the retuse petals connate into tube 4 mm. long; carpels about 10, dorsally ciliate, with 2 ciliate beaks or awns 4 mm. long. —*Weberbauer 7771* is not typical as it has sparsely ciliate vaginas, corollas 18–20 mm. long; *N. pseudoglabra* Hill of southern Bolivia, to which it is referred, is soon glabrous except for the densely long-pilose vaginas, much smaller flowers. Allied to *N. Pearcei*, with larger flowers. Illustrated, Hill, l.c. *pl. 27, figs. 9, 10* (plants); *pl. 30, fig. 24* (carpel). F.M. Neg. 9349.

Ancash: Ocros to Chonta, 4,400 meters, *Weberbauer 2785*, type; 224.—Lima: Stony slopes, Río Blanco, *3052* (det. Ulbrich, *N. longirostris*).—Junín: In deep grass of swales, Cerro de Pasco, *3085* (det. Ulbrich). Laguna Pomacocha, *Ochoa 251* (det. Killip); *487*. —Apurímac: Sorococha Pass, 4,400 meters, Chincheros to Andahuaylos, *West 3731* (det. Johnston, *N. Pearcei*).—Cuzco: Near Auzanyate Glaciers, *Weberbauer 7771* (det. Ulbrich, *N. pseudoglabra*).

Nototriche longituba Burtt & Hill, Kew Bull. 130. 1948.

Rosettes 3–4 cm. broad; leaves about 2 cm. long, stipules narrowly linear, the free part 5.5–8 mm. long, with petioles and vagina (5–5.5 mm. long) densely and long-sericeous; fertile leaves simply pinnate-lobed, the others bipinnatifid, primary lobes five, 3–4 mm. long, 1.5–4 mm. wide, stellate-tomentose above, early sericeous beneath, finally glabrous, the lobules setose-apiculate; calyx 4 mm. long, lobes narrowly lanceolate, 4 mm. long, finely stellulate; corolla white, about 15 mm. long, the tube 6–8 mm. long, glabrous; petals obovate, truncate, 4 mm. long; anthers about 12; immature carpels

beaked, very long-sericeous.—Distinctive by the long corolla tube; allied to *N. sericea* Hill but blade of fertile leaves reduced, pubescence stellate. Illustrated, Burtt & Hill, l.c. 131.

Puno: In turf, San Antonio de Esquilache, (*A. Howell Williams*, type).

Nototriche Macleanii (Gray) Hill, Bot. Jahrb. 37: 579. 1906; 230. *Malvastrum Macleani* Gray, Bot. U. S. Expl. Exped. 1: 152. 1854.

Resembles *N. aretioides*, but the blue-violet corollas 3–3.5 cm. long; leaves imbricate, ashy-green; petioles 1.5–2 cm. long; stipules adnate above the middle, the free part of the vagina linear-spathulate, 5–6 mm. long, lanate-stellate at the tips above, more or less glabrous below; leaf-blades flabelliform, palmately divided, 5–6 mm. long, 10–12 mm. wide, lanate-stellate above, subglabrous beneath, the segments deeply 3-lobed or the medial rarely 5-lobed, the lobes obovate-crenate; flowers sessile, nearly at the middle of the petioles; calyx 1.5 cm. long, the acute linear-lanceolate lobes 9 mm. long, sparsely stellate-pilose without; corolla blue-violet, 3–3.5 cm. long, the petals obcuneate, retuse, scarcely coalescent; stamens in a cylindrical column, the free filaments elongate; carpels immature, but apparently birostrate, dorsally densely stellate-tomentose.—Illustrated, Hill, l.c., *pl. 29, fig. 13* (leaf); Weberbauer, 202 (plant).

Junín: Arapa, near Yauli, 4,600 meters, *Weberbauer 382;* 221. Above La Oroya, 4,300 meters, *Weberbauer 1705;* 223. Without locality (*Maclean*, type).

Nototriche Mandoniana (Wedd.) Hill, Bot. Jahrb. 37: 579. 1906; 253. *Malvastrum Mandonianum* Wedd. Chlor. And. 2: 282. 1857.

Depressed, the rosulate leaves with petioles 2–2.5 cm. long, stipules adnate to the middle the membranous free part linear-lanceolate, acute, 1 cm. long, as the petioles and vagina glabrous dorsally, setose-stellate marginally; leaves oblong-obovate or elliptic-lanceolate, bipinnate, pinnate or sub-pinnate, 1.5–2.5 cm. long, stellate-tomentose above, glabrous below or early sparsely stellate, lacinulae unequal, linear-oblong; flowers from middle of petioles; calyx 8–10 mm. long, lobes ovate, acute, finely stellate-tomentose without; corolla rose-violet, 1.5–2 cm. long, the obovate-oblong petals retuse, coalescent into tube 5 mm. long; carpels about

9.—Differs from *N. anthemidifolia* especially in the velvety pubescent calyx and the larger flowers (Hill). F.M. Neg. 9351.

Huancavelica: Cordillera Huaytara, 4,100 meters (*Pearce*). Cordillera de Pachatusán, *Herrera 2574*, pt.—Puno: Near Poto, *Weberbauer 1002b;* 219. Bolivian boundary, *Weberbauer 1019*. Bolivia.

Nototriche Matthewsii Hill, Trans. Linn. Soc. ser. 2. Bot. 7: 248. 1909.

Depressed, caespitose, often pulvinate; petioles 1 cm. long; stipules adnate to above the middle, the free part herbaceous, subulate, 4 mm. long, tomentose above, glabrous dorsally, stellate-pilose marginally; leaves ovate-oblong, deeply palmately parted, rarely trifid or somewhat pinnatifid, 1.5 cm. long, lanate-sericeous stellate-tomentose above, glabrous beneath, the lowest segments entire or none, intermediate 7–8 mm. long, trifid or entire, medial segment 3–5-lobed, lobes all linear-oblong, obtuse, margins involute; flowers borne medially; calyx 11 mm. long, lobes acute, 7 mm. long, lanate-stellate both sides; corolla in herb. blue, 2–2.5 cm. long, petals obovate-oblong, retuse, hirsute at clawed base, nearly free; stamens in oblong head, free filaments very short; carpels 10, about 4 mm. long, stellate-tomentose, the beaks about 2 mm. long, apically ciliate.—Probably the Wilkes' U. S. Expl. Exped. specimens from Casa Canchi above Lima, referred doubtfully to *Malvastrum pinnatum* (Cav.) Baker, belong here as possibly a specimen by Gay from Cuzco (Hill); the Cavanilles' type from Chimborazo, Ecuador, reportedly had yellow flowers; nevertheless it may prove to be the same but see Hill's discussions. Petals white, the tips pale lavender (Grant). Illustrated, Hill, l.c. *pl. 29, fig. 11* (leaf). F.M. Neg. 32639.

Lima: Casa Concha, *Wilkes* (det. Gray, *M. pinnatum?*). Casapalca, *831* (det. Johnston).—Junín: Cerro de Pasco, *Matthews 682*, type. Cobracancha Valley, near Cerro de Pasco, 4,200 meters, *Grant 7509*. Huarón, *1138*. La Oroya, *Kalenborn 175* (det. Killip, *N. pinnata*).

Nototriche Meyeni [Solms] Ulbr. Bot. Jahrb. 42: 120. 1908; 239.

Depressed, pulvinate, the caudex densely branched, the rosulate leaves congested hemispherically; petioles 6–7 mm. long; stipules (free part) oval-oblong, 2–3 mm. wide, obtuse and fimbriate, sub-

glabrous both sides; leaves reniform, stellate-villous both sides, 4 mm. long, 8 mm. wide, parted or trifid, the narrowly cuneate segments obtuse; flowers about 12 mm. long, below the middle of the petioles; calyx 6–7 mm. long, its lanceolate-deltoid stellate lobes 2–2.5 mm. long, the yellowish tube glabrous; petals apparently white marked with blue-black, 7–8 mm. long, 4–5 mm. wide, obtuse, the tube 6–7 mm. long; anthers many in a globose head; carpels 9, stellate, including the 2 short beaks (Hill).—Species was confused with *N. borussica* (Meyen) Hill and *N. sajamensis* (Hieron.) Hill, the latter with filiform stipules and the former with free petioles and soft white tomentum, and was recognized in fruit by Count Solms as distinct; only much more material and study will prove the constancy of these characters. Illustrated, Hill, l.c. *pl. 28, fig. 9* (leaf); *pl. 30, fig. 12* (carpel). F.M. Neg. 9352.

Puno: Altos de Toledo, 4,700 meters, *Meyen*, type.—Huancavelica: Quispiriza, *Raimondi* (det. Ulbrich). Without locality, (*Lobb*).

Nototriche nana Hill, Kew Bull. 19. 1928.

Prostrate caespitose annual, the axillary branches 1–3 cm. long; petioles 0.5–1.5 cm. long; stipules linear-lanceolate, 2–3 mm. long, adnate to the petiole below forming a short vagina; leaves herbaceous, rosulate, greenish cinereous, minutely and sparsely stellate-tomentose as the branches, triangular-semicircular, 5 mm. long, 7 mm. wide, 3-parted to base, palmately veined, the rotund-obcuneate segments trifid or multilobed, the lobes obovate, obtuse or subacute; flowers sessile near petiole bases; calyx 3 mm. long, lobes acute, 2 mm. long, sparsely or scarcely hirsute; corolla 2.5 mm. long; stamens in a globose head; carpels 1.75 mm. long, erostrate, minutely stellate dorsally.—Near *N. pusilla* Hill but leaves basally 3-parted, carpels erostrate (Hill); an involucel of 3 filiform bractlets is usually present; petals in corolla tube as little wings (similarly in *N. sarmentosa, N. pusilla*); anthers 5; carpels 8 (Krapovickas). Illustrated, Hill, l.c. 20; Krapovickas, Bol. Soc. Argent. Bot. 4: 109b (carpel), 110c (leaf).

Tacna: Ancara, 4,300 meters, Volcan Tacora, *Werdermann 1121* (type, *N. nana*); also *1122* (det. Ulbrich). Chile.

Nototriche nigrescens Hill, Bot. Jahrb. 37: 580. 1906; 223.

Caespitose, often pulvinate; stipules adnate to middle of petioles, these often 2–2.5 cm. long, the membranous narrowly free part about 8 mm. long, more or less stellate-tomentose; leaves varying

from ovate to semicircular, flabellately 3–5-parted, about 8 mm. long, above densely, below in age more sparsely stellate, the segments 3–5-lobed, the medial the larger, the crenate obovate lobules obtuse; flowers subsessile; calyx lobes narrowly oblong, obtuse, about 12 mm. long, densely stellate tomentose without; corolla blue-lilac or violet, 2 cm. long, the broadly obovate petals retuse, basally 3 mm. connate; carpels (not mature) 3–5 mm. long, shortly birostrate, dorsally densely stellate, the beaks ciliate.—The numerous stamens are in a globose head, the filaments rather long, the anthers dark purple-green; suggest *N. flabellata* in lobation, the leaves only sparsely stellate below (Hill), but as to type and *7881* this refers only to old leaves; indument especially of vagina is stellate-hirsute. F.M. Neg. 9354.

Junín: Hacienda Arapa near Yauli, 4,400 meters, *Weberbauer 381*, type; 221.—Cuzco: Above Marcapata, 4,800 meters, *Weberbauer 7881* (det. Ulbrich). Paucartambo Valley, *Herrera 1052* (det. Killip). "Huikkuna-thurpa" (Herrera).

Nototriche obcuneata (Bak. f.) Hill, Bot. Jahrb. 37: 579. 1906; 225. *Malvastrum obcuneatum* Bak. f. Journ. Bot. 29: 363. 1891. *M. lobulatum* Wedd. Bull. Soc. Bot. Fr. 12: 82. 1865?

Depressed, pulvinate; petioles 1–2 cm. long; stipules adnate above the middle of the petiole, the membranous free part linear, acuminate, about 7 mm. long, glabrous except the stellate margins; leaf-blades semicircular or reniform, flabellately 9–13-parted, 4–6 (8) mm. long, 8–9 mm. wide, densely stellate-tomentose above, nearly glabrous beneath, the segments 3–7-lobed, the obovate or spathulate inflexed lobes unequally 5-crenate or -incised, about 11 mm. long; flowers at about middle of petioles; calyx 6 mm. long, the teeth tomentose; corolla apparently violet, to 2 cm. long, the obovate or obcuneate petals retuse, coalescent into a tube 5 mm. long; carpels 8–10, 7 mm. long, the beaks about 3 mm. long, dorsally stellate-hirsute.—Flowers blue (Baker); at first rose, becoming white (Weberbauer). As original description of Baker gives petals as only 8 mm. long the Bolivian plant may be distinct from the Peruvian collections referred here, former correctly *N. lobulata* (Wedd.) Macbr., comb. nov. Illustrated, Hill, l.c., *pl. 28, fig. 2* (leaf). F.M. Neg. 23750.

Lima: Casapalca, *833* (det. Ulbrich).—Puno: Poto, Prov. Sandía, 4,500 meters, *Weberbauer 983*. Ananca, 4,700 meters, *Weberbauer 1023*.—Tacna: Volcan Tacora, *Werdermann 1400* (det. Ulbrich). Northern Bolivia.

Nototriche obtusa Hill, Bot. Jahrb. 37: 583. 1906; 220.

Caespitose, often pulvinate; petioles, these 7–8 mm. long, and stipules, these medially adnate, the vagina membranous, the herbaceous linear obtuse free part 3–4 mm. long, stellate-pilose only dorsally and marginally, the trichomes not at all interlocked; leaves reniform, flabellately or palmately dissected, 4–5 mm. long, 9–10 mm. wide, above densely, below laxly stellate-tomentose, the segments 3-lobed or entire, obovate-oblong; flowers below middle of petioles; calyx lobes narrowly oblong, obtuse, 1 cm. long, stellate-tomentose without; corolla violet, 1.5–2 cm. long, the obliquely obovate or basally cuneate petals coalescent into a tube 6 mm. long; stamens globosely capitate.—This species shows fairly close resemblance to *N. artemisioides* (Hill), and also to *N. famatinensis*. Illustrated, Hill, l.c. *pl. 30, figs. 2, 4* (calyx with nectar glands). F.M. Neg. 9355.

Ancash: Above Piscapaccha, 4,500 meters, *Weberbauer 2897*, type; 224.

Nototriche Orbignyana (Wedd.) Hill, Bot. Jahrb. 37: 579. 1906; 237. *Malvastrum Orbignyanum* Wedd. Chlor. And. 2: 279. 1857. *M. Copelandii* Hieron. Bot. Jahrb. 20: Beibl. 49: 43. 1895, fide Hill.

Pulvinate; leaves densely congested, lanate stellate above, sparsely tomentose beneath; petioles 12–15 mm. long; stipules medially adnate, free part filiform, 10–12 mm. long, sparsely stellate-tomentose as vagina; leaf blades flabellate, unequally trifid, 6–8 mm. long, 12–14 mm. wide, lateral segments 4-parted, the lacinulae sometimes 3–4-lobed, smaller medial segment 3–5-lobed, the lacinulae linear, obtuse, 2–4 mm. long; calyx 8 mm. long, tube sparsely stellate, lobes about 5 mm. long, acute, glabrous within; corolla 10–12 mm. long, purple or deep blue, the retuse broadly obovate petals coalescent into a tube less than 2 mm. long; stamens in a globose head; carpels sericeous-pilose, 2.5 mm. long, beaks about 1 mm. long (not quite mature).—In *N. sajamensis* the leaves are less deeply divided and the corolla tube is 5 mm. long (Hill). F.M. Negs. 35506; 9356 (*M. Copelandii*).

Arequipa: Vincocaya, 4,376 meters, (*Copeland*, type, *M. Copelandii*). Bolivia.

Nototriche Pearcei (Bak. f.) Hill, Bot. Jahrb. 37: 579. 1906; 255. *Malvastrum Pearcei* Bak. f. Journ. Bot. 29: 364. 1891.

Depressed, the caudex branched, the rosulate leaves with petioles to 7 cm. long, the stipules adnate to above the middle, the free part herbaceous, linear, acute, 8 mm. long, puberulent-stellate above, glabrous beneath, the vagina and petioles more or less stellate-pilose only marginally; leaves oblong-lanceolate, bipinnate, 1–2 cm. long, sparsely stellate-tomentose above, glabrous below, the segments entire or trifid, apically ciliate; flowers shortly pedicellate at the middle of the petioles; calyx 12 mm. long, the triangular, acute lobes 4–5 mm. long, without sparsely stellate, within densely tomentose; corolla rose-colored, 2–2.5 cm. long, the obovate retuse petals 1 cm. wide, coalescent into a tube 2 mm. long; stamens in an oblong head, the free filaments elongate; carpels with conspicuous beaks, dorsally long-ciliate.

Apurímac: Andahuaylas, (*Pearce*, type).—Ayacucho: Huanta, (*Pearce*).

Nototriche pedatiloba Hill, Trans. Linn. Soc. ser. 2. Bot. 7: 240. 1909.

Depressed, caespitose, forming small cushions with ligneous, branched caudex; leaves more or less imbricate, grayish-green; petioles about 8 mm. long; vagina membranous, 6 mm. wide, the free part 2 mm. long, 3 mm. wide, truncate, dorsally glabrous, marginally stellate-fimbriate; leaf-blades semicircular or reniform, flabellately about 11-parted, 3 mm. long, 7 mm. wide, ashy stellate-pubescent above, glabrescent below, the segments deeply 4–5-lobed, the 50 or more lobules fleshy, linear-obovate, obtuse, 1.5 mm. long; flowers from near the base, shortly peduncled; calyx campanulate, somewhat inflated, reddish purple, 1 cm. long, the obtuse pubescent lobes 3 mm. long, the tube glabrous; corolla violet, 16–18 mm. long, the retuse petals connate into a tube 5 mm. long; carpels 6–8, 5–6 mm. long, rostrate, stellate-tomentose, the beak stellate-ciliate, about 2 mm. long.—The deeply and multilobed leaves point to a relationship with *N. sajamensis* and *N. Meyeni;* the erect fleshy lobulae, which occur in little groups of 4 or 5, are really the lobes of the leaf divided almost to their bases, each leaf thus consisting of about 50 lobulae borne on a small pedate expansion; the plant is unique by its broadly truncate, membranous stipules and the finally inflated calyx (Hill). The var. *appendiculata* Burtt, Kew Bull. 132. 1948 is marked by 2 appendages arising from the surface of the vagina, either linear, membranous, 3–4 mm. long, margins pilose or reduced to glabrous teeth 0.5 mm. long. The author (l.c.) discusses the possible character of these appendages, suggesting that

the phenomenon of diplophylly may be concerned. Illustrated, Hill, l.c. *pl. 27, fig. 4* (plant); *pl. 28, fig. 12* (leaf); *pl. 30, fig. 5* (calyx); *pl. 30, figs. 10, 20* (fruits); Burtt, l.c. (var. *appendiculata*).

Arequipa: Vincocaya, 4,376 meters, carpeting the ground with *N. argylloides*, near summit of Arequipa-Puna railway (*Hill 78*, type).—Puno: Minas de San Antonio, *Sandeman 3920A; 3931* (var.). San Antonio de Esquilache (*Stafford 705A*, type, var.).

Nototriche pedicularifolia (Meyen) Hill, Bot. Jahrb. 37: 579. 1906; 246. *Sida pedicularifolia* Meyen ex Walp. Nov. Act. Acad. Leop.-Carol. 19: Suppl. 1: 308. 1843. *N. incana* Turcz. Bull. Soc. Nat. Mosc. 36, pt. 1: 567. 1863, fide Hill.

Habit of the related *N. argylloides*, but all vegetative parts, except glabrate stipules, densely ashy stellate-tomentose; petioles 2–3 cm. long; stipules adnate medially, free part linear, acuminate, 1 cm. long; leaves cordate or pentagonous, 2 cm. long, 1.5–2 cm. wide, palmately 3–7-parted, the segments subpinnatifid, incised crenate, lacinulae crisped, obtuse, the largest medial segment bipinnatifid the lateral smaller, simpler; flowers borne medially; calyx 8 mm. long, the ovate lobes subacute; corolla violet, 15 mm. long; petals linear- or cuneate-oblong, 3 mm. wide, retuse, scarcely coalescent; stamens in oblong head; carpels about 12, rounded, 2 mm. long, dorsally pilose with long silky pure white trichomes.—*M. pulverulenta* Burtt & Hill, Kew Bull. 135. 1948, of Sajama, Bolivia, may occur in Peru. It is of interest as the anther column is 3 mm. long, 2.5 mm. wide, and in this character approaches species with globosely borne anthers, the petals coalescent 5 mm., pilose at base, broadly obovate, carpels beaked. Illustrated, Hill, l.c. *pl. 27, fig. 5* (plant); *pl. 30, fig. 16* (carpel). F.M. Neg. 9357.

Arequipa: Vincocaya (*Copeland*).—Puno: Near Pisacoma, *Meyen*, type. Ananca, 4,700 meters, *Weberbauer 1023*, part.—Tacna: Tacora, *Weddell; Meyen.* Bolivia; Chile.

Nototriche pellicea Hill, Kew Bull. 133. 1948.

Depressed, caespitose, pulvinate, hirsute; petioles 4 mm. long; vagina 2.5–3 mm. broad; stipules adnate about medially, the free part linear-lanceolate, acute, 4 mm. long, 1 mm. wide, only dorsally densely stellate-tomentose as the oblong-orbiculate leaves, these 4.5 mm. long, 6 mm. wide, deeply 5- or 7-parted, the segments digitately lobulate with 30–50 narrowly linear-oblanceolate lobules; flowers from near base of petioles; calyx cylindric-campanulate,

7–7.5 mm. long, tube glabrous, lobes stellate-hirsute both sides, to 3.5 mm. long, acute; corolla white, 1 cm. long, the petals with purple lines without, the hirsute tube 3 mm. long; carpels 3.75 mm. long, beaks 1.25 mm. long, stellate-setose.—Like *N. turritella* Hill but with narrow longer leaf lobes, stipules larger, trichomes longer, flowers white-purple, carpel beaks larger (Hill). Illustrated, Hill, l.c. 134.

Type found only on barren exposed places above copper veins, and ash from plants tested quantitatively contained 0.77 per cent copper.

Puno: Santa Lucía, 4,570 meters, (*Sharpe 168*, type). "Turp."

Nototriche phyllanthos (Cav.) Hill, Trans. Linn. Soc. ser. 2. Bot. 7: 232. 1909. *Sida phyllanthos* Cav. Diss. 5: 276, *pl. 127*. 1788. *Sida saxifraga* Humb. & Bonpl. Pl. Aequin. 2: 116. 1813, fide Hill.

Pulvinate, about 3 cm. across; petioles about 8 mm. long, the stipules adnate to middle or rarely nearly to leaf blade, the resulting vagina 3.5–4 mm. wide, free part subacute, subglabrous, margins stellate, 3–4 mm. long; leaves rotund-reniform, 3-parted, 8–10 mm. long, 10–13 mm. wide, the segments 3–5-parted or -lobed, the ovate-oblong lacinulae rarely lobulate, velvety pubescent above, vernicose, glabrous or very sparsely stellulate beneath; flowers about from middle of petioles; calyx stellate, 1 cm. long; corolla 18–20 mm. long, violet, the petals scarcely coalescent basally; stamens in a cylindrical column; carpels about 9 mm. long, stellate-ciliate, the beaks 4 mm. long.—After Hill who, however, drew the description from Ecuadorean plants, the type, from Peru (maybe from Guayaquil region) unknown to him. Hill describes at length the identity and relationship. F.M. Neg. 35507 (*S. saxifraga*).

Peru (probably): *Dombey*, type. Ecuador.

Nototriche pichinchensis (Humb. & Bonpl.) Hill, Bot. Jahrb. 37: 579. 1906; 231. *Sida pichinchensis* Humb. & Bonpl. Pl. Aequin. 2: 115. 1813. *Malvastrum pichinchense* (Humb. & Bonpl.) Gray, Bot. U. S. Expl. Exped. 152. 1854.

Resembles closely *N. phyllanthos*, at least as interpreted, but typically larger, sometimes 6–8 cm. across; petioles 2–4, or in var. less than 1 cm. long; stipules subulate, the free part 7–10 mm. long; leaves in type 18 mm. long, 22 mm. wide, divided as in *N. phyllanthos* or in var. 1 cm. long, 16 mm. wide, the 3 segments trilobed and each again trilobed; calyx 16 mm. long or in var. 10–13 mm.

long; corolla about 3 cm. long, in var. 2 cm. long.—Seems via the variant (var. *angusta* Hill of Ecuador) to pass into *N. phyllanthos.* However since Ulbrich (Notizbl. Bot. Gart. Berlin 11: 527. 1932) has retained the species, his identification without more material may be followed. Illustrated, Humb. & Bonpl., l.c., *pl. 116.*

Cuzco: Valle del Paucartambo, 3,600 meters, *Herrera 1816* (det. Ulbrich). Ecuador.

Nototriche porphyrantha Ulbr. Bot. Jahrb. 54: Beibl. 117: 62. 1916.

Similar to but apparently well distinct from *N. flabellata;* vagina 2–3 mm. wide, stipules (free part) subulate-linear, about 1 cm. long, marginally stellate; leaf blades greenish, rather lightly and finely floccose-stellate above, subtomentose beneath, 22–25 mm. long, 18–25 mm. wide, trifid, the medial lobe cuneate-obovate, the lateral obliquely obovate, 2–3-cleft, the lobes all incised-crenate; flowers shortly pedicellate; calyx 18 mm. long, lobes ovate-lanceolate, glabrous within; corolla purple, about 3 cm. long; stamen 3.5 cm. long; anthers in globose-ovoid head; carpels long-villous, the villous beaks 6–7 mm. long.—F.M. Neg. 9358.

Cuzco: On rocks, Pisac to Paucartambo, 4,000 meters, *Weberbauer 6917,* type.

Nototriche purpurascens Hill, Trans. Linn. Soc. ser. 2. Bot. 7: 249. 1909.

Depressed, the stout branched caudex to 1.5 cm. across, the rosulate leaves with petioles 1.5–4 cm. long, stipules adnate nearly to the middle, the vagina 3 mm. wide, the free part narrowly triangular, acute, 5 mm. long, glabrous; leaves broadly ovate or pentagonous, palmately parted, 2 cm. long, 2–2.5 cm. wide, densely stellate-tomentose above, glabrous beneath, the lowest segments subentire, 7–10 mm. long, the intermediate pinnate with 6–10 lacinulae, medial segment pinnate with larger and smaller lobes alternating, all with strongly inflexed margins; flowers borne about medially; calyx 2 cm. long, the lobes broadly ovate, acute, 1 cm. long, glabrous without, tomentose within, purplish; corolla copper-colored, 3–3.5 cm. long, the obovate petals truncate or retuse, their tube 3–4 mm. long; stamens in a globular head, subsessile, few, dark purple; carpels densely pilose dorsally, shortly birostrate, about 4 mm. long (scarcely mature).—The corolla was described as 22 mm. long, but probably

not fully grown, as the Herrera plant has some similarly undeveloped flowers. F.M. Neg. 23781.

Cuzco: Valle del Paucartambo, 3,700 meters, *Herrera 1034.* Bolivia.

Nototriche pusilla Hill, Bot. Jahrb. 37: 587. 1906; 218.

Caespitose-pulvinate annual, the leaves in a terminal rosette and with short spreading horizontal branches terminating in rosettes of leaves and flowers; petioles 5 mm. long; stipules of leaves without flowers little adnate, of those with flowers adnate medially forming membranous vagina, the filiform acute free part 2–3 mm. long, laxly stellate-tomentose dorsally and marginally; leaves more or less cordate or orbicular, crenate or somewhat dentate, 5 mm. long, 6 mm. wide, loosely stellate-tomentose both sides; flowers medial, sessile; calyx lobes 4–4.5 mm. long, sparsely tomentose both sides; corolla white, 3–4 mm. long; carpels 1.5 mm. long, minutely birostrate, dorsally stellate-hirsute.—The dense tomentum is somewhat shaggy (Hill); flowers have no involucel; petals inserted as in *N. nana* and *N. sarmentosa;* anthers 5; carpels dehiscent, about 10 (Krapovickas, Bol. Soc. Argent. Bot. 4: 111. 1951). Illustrated, Hill, l.c., *pl. 29, figs. 20, 21* (plants); *pl. 30, fig. 29* (carpel). F.M. Negs. 9360; 35508.

Ancash: Near Chonta, 4,400 meters, *Weberbauer 2788;* 224. Without locality, *Weddell,* type (Herb. Paris). Bolivia; Argentina.

Nototriche pygmaea (Remy) Hill, Trans. Linn. Soc. ser. 2. Bot. 7: 218. 1909. *Sida pygmaea* Remy, Ann. Sci. Nat. sér. 3, 8: 238. 1847. *Malva pygmaea* (Remy) Wedd. Chlor. And. 2: 274. 1857. *Malvastrum pygmaeum* (Remy) Gray, Bot. U. S. Expl. Exped. 150. 1854.

Small annual about 4 cm. long, the caudex shorter than 1 cm.; petioles 4 mm. long; stipules medially adnate, the subulate free part 3 mm. long, dorsally stellate tomentose; leaves reniform or subflabelliform, about 2 mm. long, 3 mm. broad, incised-crenate or lobate, the lobes 8–10, densely stellate-tomentose both sides; flowers borne medially, pedicellate; calyx about 4 mm. long, triangular lobes densely tomentose; flowers white or with dark center, 3 mm. long, obovate petals with 1 mm. long tube; carpels 7, minutely stellate at rounded tip, 1 mm. long.—Type by D'Orbigny near the Laguna de Potosi, Bolivia, due east of Tacna (Hill). Illustrated,

Hill, l.c., *pl. 29, figs. 22, 24* (plant and flower); *pl. 30, fig. 30* (carpel). F.M. Negs. 35509.

Moquehua: East of Carumas, 4,500 meters, *Weberbauer 7359* (det. Johnston). Bolivia.

Nototriche rugosa (Phil.) Hill, Bot. Jahrb. 37: 579. 1906; 245. *Malvastrum pedicularifolium* (Meyen) Gray, var. *rugosum* Phil. ex Reiche, Fl. Chile 1: 235. 1896.

Depressed, often pulvinate, the rosulate leaves ashy pulverulent-stellate except medially beneath, the petioles 2–5 cm. long, the stipules adnate about medially, the free part membranous, subulate, to 5 mm. long, as petioles glabrous except ciliate marginally; leaves palmately 5-parted or digitately lobed, about 1 cm. long and broad, the pinnatifid lobes incised crenate, crisped; flowers at about the middle of the petioles; calyx 6–7 mm. long, tube glabrous, lobes ovate, obtuse, 2–2.5 mm. long, pulverulent; corolla white or blue, 7–8 mm. long; petals obovate, the tube 3 mm. long; stamens few in globose head.—F.M. Neg. 9362.

Tacna: Volcan Tacora, 4,400 meters, *Werdermann 1398* (det. Ulbrich). Northern Chile.

Nototriche sajamensis (Hieron.) Hill, Bot. Jahrb. 37: 579. 1906; 243. *Malvastrum sajamense* Hieron. Bot. Jahrb. 21: 319. 1895.

Depressed, pulvinate; leaves rosulate and more or less imbricate at the tips of the branches, more or less densely stellate-tomentose or beneath subglabrous; petioles 6–8 mm. long, the stipules adnate to above the middle forming a vagina 4 mm. wide, the free part linear-filiform, about 5 mm. long, 1 mm. wide, the entire organ glabrous or margins stellate-ciliate; leaf blades reniform, flabellately 9–11-parted, 4–5 mm. long, 10–12 mm. wide, the segments deeply trifid, the laciniae deeply bifid or trifid with obtuse lacinulae, 1.5–2 mm. long; flowers basal, pedicellate; calyx 8–9 mm. long, the lobes obtusish, 3 mm. long, stellate-hirsute, the tube subglabrate; corolla yellowish-white (drying dark purple), 10–14 mm. long, ovate petals acutish, tube about 5 mm. long; carpels (immature) stellate-ciliate, the beaks 1.5 mm. long.—Appears to be allied with *N. Orbignyana* and *N. alternata* (Hill). But compare *N. condensata.* Illustrated, Solms, Bot. Zeit. 65: 120. *pl. 2, figs. 1, 3, 14;* Hill, l.c. *pl. 28, fig. 14* (leaf). F.M. Negs. 9364; 9365.

Tacna: Volcan Tacora, *Stübel* (*Steinmann*). Bolivia.

Nototriche salina Burtt & Hill, Kew Bull. 135. 1948.

Caudex often branched toward apex, bearing rosettes 2–4 cm. in diameter; free part of stipules membranous, 4–5 mm. long, 1.5–2.5 mm. wide, triangular-lanceolate, acute, adnate for 5 mm., forming glabrous vagina 4.5–5 mm. broad; leaves ovate-cordate, with 5 primary lobes disposed palmately, pinnately lobulate with obtuse segments, sparsely stellate only above if at all; calyx 5 mm. long, lobes 1.5 mm. long, glabrous or nearly so without, pilose within marginally and toward the apex, basal nectaries semicircular; corolla dark purple, tube glabrous, 1.5–2 mm. long, petals obovate, emarginate, about 5 mm. long, glabrous; anthers in globose head; carpels 4–4.5 mm. long, beaks 1.5 mm. long, dorsally long-sericeous. —Resembles *N. aristata* Hill, *N. longirostris* (Wedd.) Hill and *N. rugosa* (Phil.) Hill of Chile; it differs from the first two by the glabrous or subglabrous leaves and from the last also by the rostrate carpels (Hill). Illustrated, Hill, l.c. 137.

Arequipa: In turf, sand and volcanic ash, Borax Lake, Salinas Pichu Pichu, (*Stafford 1325*, type).

Nototriche sarmentosa Hill, Kew Bull. 20. 1928. *N. Wedermannii* Ulbr. Notizbl. Bot. Gart. Berlin 11: 529. 1932.

Prostrate annual sarmentose herb, the axillary branches 4–7 cm. long, sparsely and laxly stellate as the petioles, these 8–12 mm. long, and the linear-lanceolate half adnate stipules; leaves rosulate, semicircular, herbaceous, medially (more or less) trilobed, 4–5 mm. long, (4) 7–13 mm. wide, minutely velvety stellate, medial lobe sub-trilobulate, the lobules themselves 4–7-lobulate, the ultimate crenate; flowers sessile in the middle of the petioles; calyx 5 mm. long, medially 5-lobed, the lobes acute; corolla about 2.5 mm. long, tube 0.5 mm. long; stamens few; carpels 1.75 mm. long, apically stellulate.—Allied to *N. nana* Hill but coarser with larger leaves medially trifid, and carpels minutely rostrate (Hill), adhering to seeds; flowers often with an involucel of 2 filiform bractlets; corolla tube persists as a disk (Krapovickas, Bol. Soc. Argent. Bot. 4: 108. 1951). Illustrated, Hill, l.c. F.M. Neg. 23751.

Tacna: Ancara, Volcan Tatora, 4,300 meters, *Werdermann 1123*, type (also type of *N. Werdermannii*). Argentina.

Nototriche sericea Hill, Trans. Linn. Soc. ser. 2. Bot. 7: 258. 1909.

Depressed, the caudex branched, the rosulate leaves with petioles to 3 cm. long, the stipules adnate about to the middle and with

vagina 2 mm. wide, the membranous subulate filiform free part 1 cm. long, densely as vagina above and marginally sericeous ciliate, glabrous dorsally; leaves triangular-ovate, palmately parted, the segments pinnate or bipinnate, above more or less densely, beneath very sparsely sericeous, the lobes entire or 3–5-cleft, the numerous ultimate lacinulae narrowly linear, obtuse; flowers borne medially, pedicellate; calyx 8–9 mm. long, lobes acute or acuminate, 3–4 mm. long, without and marginally sparsely ciliate, the tube glabrous; corolla blue-violet, 14–17 mm. long, the obovate-cuneate retuse petals coalescent into a tube 4–5 mm. long; stamens borne globosely, the free filaments long; carpels about 13, 4 mm. long, densely sericeous, the beaks 2 mm. long.—Distinguished by its silky gray appearance and the many linear segments of the leaves, and the minute anthers; trichomes are sessile with 2–4 long arms (Hill). Illustrated, Hill, *pl. 29, figs. 9, 10* (leaf, flower).

Puno: Crucero Alto, 4,470 meters (*Hill 82*, type).

Nototriche Staffordiae Burtt & Hill, Kew Bull. 136. 1948.

Globosely rosulate plants 2.5–4 cm. in diameter and unique by the character of the trifid calyx-lobes; caudex mostly simple; free part of stipules linear, acute, 7 mm. long, adnate with vagina 5 mm. long, free part of petiole 3 mm. long, stellate-pilose (as stipules); leaves 4–5 mm. long, 10 mm. wide, 9-dissected more than medially, these divisions 5-lobed, the lobules linear; calyx campanulate, stellate-pilose, 8 mm. long, the lobes trifid more than medially, the linear divisions 2.5 mm. long; corolla tube 1 mm. long, glabrous; petals obovate, 6.5 mm. long, 4.5 mm. wide, glandular-pubescent medially and ciliate toward base, strongly veined, greenish striped with brown; anthers in a globose head; carpels (immature) densely stellate-pilose, shortly and obtusely rostrate.—Corolla tube adheres subpersistently to the calyx; the corolla disarticulates above the base leaving a rim apparent as a flap if calyx is dissected before anthesis. This interesting species commemorates fittingly the intelligent collecting of Miss P. Stafford. Illustrated, Burtt & Hill, l.c. 137.

Puno: Sandy slopes just below moraine, 4,570 meters, San Antonio de Esquilache (*Stafford 1263*).

Nototriche stenopetala (Gray) Hill, Bot. Jahrb. 37: 579. 1906; 251. *Malvastrum stenopetalum* Gray, Bot. U. S. Expl. Exped. 155. 1854.

Depressed, pulvinate; petioles 12 mm. long, the stipules adnate nearly to the middle, the vagina 3 mm. wide, membranous and glabrous as the subulate free part, this 3 mm. long; leaves triangular or cordate, 10 mm. long, 12–13 mm. wide, white stellate velvety above, glabrous beneath, trifid, the more ample middle lobe pinnate, segments trifid or entire, the lobes 3–5 mm. long, linear-oblong, little inflexed, often ciliate; flowers from below the middle of the petioles; calyx 9 mm. long, lobes narrowly triangular, subacuminate, sparsely stellate without, densely white tomentose within; corolla scarlet, 17 mm. long, the narrowly spathulate petals entirely or essentially free; stamens few in cylindrical head; carpels about 12, hirsute.—My specimens from wet grassy pond-slope, petals scarlet above, white below, red-veined. Illustrated, Hill, l.c. *pl. 29, fig. 17* (leaf).

Lima: Casa Cancha, *Pickering*, type. Without locality (*Maclean*).—Junín: La Oroya, *Kalenborn 116* (det. Killip). Hacienda Arapa near Yauli, *Weberbauer 344*. Cerro de Pasco, *3061*.

Nototriche sulphurea Hill, Bot. Jahrb. 37: 583. 1906; 248.

Robust, caespitose, the caudex to 2.5 cm. in diameter; leaves laxly rosulate, densely stellate-tomentose with long sulphur-colored trichomes, this indument also covering the petioles (4 cm.), medially adnate filiform acute stipules (12–15 mm.) and ovate acute calyx lobes (11 mm.) without; leaves broadly ovate-cordate or pentagonous, palmately parted or pinnatifid, 2–2.5 cm. long and nearly as wide, the oblong segments pinnatifid, the obovate laciniae entire or incised-crenate; flowers medial, sessile; corolla pale blue, 2–3.5 cm. long, the obcuneate petals retuse, tomentose at base, scarcely coalescent into short tube; carpels 15–20, 5 mm. long, beaks 1 mm. long, dorsally sericeous.—Stamens in a more or less oblong head (Hill). The dense villous pubescence and much divided leaves are striking characters. Illustrated, Hill, l.c. *pl. 29, figs. 3, 4* (leaves). F.M. Neg. 9366.

Cuzco: Puna above Marcapata, *Weberbauer 7882; Herrera 296* (both det. Ulbrich). Prov. Canas, *Herrera 932* (det. Standley, *N. porphyrantha*).—Puno: Poto to Ananca, Prov. Sandía, 4,700 meters, *Weberbauer 963*, type; 219. Andes of Pebechucho (*Pearce*). "Thurpa" (Herrera).

Nototriche ticsanica Ulbrich, Notizbl. Bot. Gart. Berlin 11: 531. 1932.

Pulvinate, the densely rosulate leaves or branches 2 cm. long; petioles 12–15 mm. long, the stipules adnate to above the middle, free part 5 mm. long, triangular lanceolate, only marginally stellate-villous; leaves obovate-orbicular, 7–8 mm. long, 8–10 mm. wide, flabellately multiparted, the lobes obtuse, above densely, beneath glabrate or early sparsely tomentose; flowers purple, sessile; calyx about 8 mm. long, sparsely stellate, the lobes nearly 3 mm. long, densely villous; petals about 13 mm. long, oblong-obovate; stamen tube cylindric, 1 cm. long, the filaments 1.5–2 mm. long, in a globose head.—Petals white within, purple without except below (Weberbauer). Allied to *N. coccinea* with smaller leaves divided less, scarlet somewhat larger flowers (Ulbrich). However, compare *N. condensata* and note.

Moquehua: Carumas near Volcano Ticsani, 4,400 meters, *Weberbauer 7320*, type.

Nototriche turritella Hill, Trans. Linn. Soc. ser. 2. Bot. 7: 241. 1909.

Caespitose, the ultimate branches densely clothed with leaf-remains and verticillate floriferous and sterile leaves, erect and turret-like, 2–6 cm. high, the pale violet flowers with deep purple centers sessile in the crowded leaf-rosettes at their tips; petioles 4–6 mm. long; stipules nearly completely adnate, forming vagina 3 mm. wide, the linear-oblong free part obtuse, 3 mm. long, the entire structure glabrous except the stellate-tomentose margins; leaves broadly cuneate or cuneate-reniform, obscurely trifid, 4–5 mm. long, 8 mm. wide, early densely stellate both sides, small medial segment 9–11-parted, the lateral segments 3–5-lobed, the lobes multilobulate, these ultimate lacinulae in 4's or 5's, the tips soon glabrous, their upper margins inflexed; calyx tubular campanulate, 9 mm. long, lobes 3.5 mm. long, densely stellate except the obtuse fleshy tips; corolla 13–15 mm. long, more or less rotate, petals broadly obovate, scarcely retuse, with tube 5 mm. long; carpels about 8, usually only 1 maturing, 4 mm. long, stellate-pilose, beaks about 1 mm. long.—In black volcanic ash slopes of El Misti with a vertical range of about 1,000 meters, conspicuous and beautiful when in full flower around the middle of March (Hill). Illustrated, Hill, l.c. 202 (habit photograph); *pl. 27, figs. 1, 2* (plants); *pl. 28, figs. 11* (leaf and flower), 16 (leaf-blade); *pl. 30, figs. 6* (open flower), *13* (carpel).

Arequipa: Volcano El Misti, 4,000–5,000 meters, (*Hill*, type); *Solon I. Bailey*. Alto de los Huesos, 3,700 meters, *Weberbauer 1421*.

—Tacna: Volcan Tacora, 4,500 meters, *Werdermann 1404* (det. Ulbrich).

Nototriche ulophylla (Gray) Hill, Bot. Jahrb. 37: 579. 1906; 224. *Malvastrum ulophyllum* Gray, Bot. U. S. Expl. Exped. 1: 150. 1854.

Similar and closely allied to *N. obcuneata;* petioles to 12 mm. long; stipules adnate to about the middle of the petiole, the free part broadly linear subacute, about 6 mm. long; leaves reniform-rotund, 7–11-parted flabellately to the middle, 5–6 mm. long, 8–10 mm. wide, the 3–7-lobed segments extremely crowded, the lobulae obovate, involute and crisped; calyx 6 mm. long, the obtuse lobes very sparsely stellate; corolla 6–7 mm. long; carpels 8, about 1.5 mm. long, but immature, minutely rostrate, densely sericeous-hirsute dorsally, the trichomes 3–4 mm. long.—Differs from the related species in having longer lateral or secondary lobulae, which are often again lobed, and the entire leaf has a very crisped appearance; it also differs in the smaller flowers (Hill). Illustrated, Hill, l.c., *pl. 28, fig. 1* (leaf).

Lima: Alpamarca, near the snow line, *Pickering*, type. Casapalca, *833* (det. Johnston).—Huancavelica: Pisco to Ayacucho, 4,800 meters, *Weberbauer 5445*.

Nototriche Vargasii Krap. Bol. Soc. Argent. Bot. 5: 73. 1953.

Depressed perennial, the ligneous subterranean caudex about a cm. in diameter; stipules medially connate forming a glabrous vagina, to 2 cm. long, 2.5–3 mm. wide, the linear-lanceolate free portion to 1 cm. long, 2 mm. wide, sparsely ciliate apically; leaves unequally pinnatifid, about 5 cm. long, 4–5 cm. wide, the smaller lanceolate lower divisions opposite, entire, the narrower longest medial pair more or less pinnately lobed, 2–2.5 cm. long, the remaining upper divisions much reduced and subentire, all stellulate-tomentulose above, glabrous beneath, some lobes terminally ciliate; flowers solitary; calyx campanulate, about 2 cm. long, glabrous except slightly stellate in the 5 nerves above and puberulent on the edges of the broadly triangular (7 mm. long) teeth; nectaries about 4 mm. long and broad, connate at base; corolla red, about 3.5 cm. long, the tube 7–8 mm. long, 6 mm. in diameter at base, the obovate petals obliquely truncate, about 12 mm. wide, pilose at base between the plaits and the upper part of the tube; anthers in a globose head; stigmas capitate, 17; carpels (immature) rigidly stellate and aristate. —Distinguished from all related species by the large red flowers and

deeply pinnatifid leaves (Krapovickas). Illustrated, l.c. *fig. 7* (leaf, flower).

Cuzco: Hacienda Poqquera, Prov. Espinar, 4,500 meters, (*Vargas 10582*, type).

18. GAYA HBK.

Like *Sida* except that the membranous inflated carpels converge apically, dehiscing dorsally in 2 valves and developing within an incurved erect appendage (endoglossum) originating near base of dorsal wall, later separating, often apparently attached to ventral wall and more or less enclosing seed; 2–3 ligaments hold each carpel to columella until maturity.—Kearney, Amer. Midl. Nat. 46: 123, quotes Hochreutiner's observations that explain the development of the endoglossum and the ligaments, previously misinterpreted. Students are referred to the full account of this and other similarly fascinating studies by Hochreutiner, Ann. Cons. Jard. Bot. Genève 21: 347–387. 1920. The several Peruvian forms are not clearly distinct and a revision of the genus is very much needed.

Leaves mostly 7–10 cm. long, glabrate above in age.
Flowers in 2's or 3's in the upper axils.....*G. triflora.*
Flowers all solitary.....*G. calyptrata.*
Leaves mostly or all 3–5 cm. long, densely tomentose even in age on both sides.....*G. peruviana, G. jaenensis, G. Weberbaueri.*

Gaya calyptrata (Cav.) HBK. ex Schum. in Mart. Fl. Bras. 12, pt. 3: 351. 1891. *Sida calyptrata* Cav. Diss. 2: 57. 1786. *S. nutans* L'Hér. Stirp. Nov. 5: 119 bis, *pl. 57* bis. 1789. *S. disticha* Cav. Icon. 5: 12, *pl. 432*. 1799.

Slender-stemmed shrub, the branching stems glabrous below, minutely stellate-tomentulose toward the tips as the membranous cordate-ovate acuminate coarsely serrate leaves of these glabrate in age above, commonly 7–10 cm. long, about 6 or 7 cm. wide at base; peduncles typically capillary, solitary, often reflexing, 2 or more cm. long, 5 cm. or longer in fruit; calyx lobes ovate, acuminate, about 5 mm. long; petals 10–12 mm. long; fruits depressed, puberulent, about 1 cm. across the slightly reticulate obtuse carpels with parchment-like walls.—Quite possibly should be drawn to include *G. Weberbaueri* Ulbr. (which see) but the original specimen is the large-leaved plant with light pubescence illustrated by L'Héritier, l.c. F.M. Negs. 29777; 29781 (*S. disticha*).

Lima: Sands near Lima, *Dombey*, type. Without locality, *Ruiz & Pavón* (type, *S. nutans*).—Cuzco: Chacra de Caña, Prov. Anta, *Vargas 145*. To Mexico?

Gaya jaenensis Ulbr. Notizbl. Bot. Gart. Berlin 11: 539. 1932.

Few-branched cinereous-velutinous pubescent shrub, the close indument yellowish in the leaves and calyces; stipules 3 mm. long, promptly caducous; petioles 2–5 mm. long; leaves oblong-lanceolate, 2–3 cm. long, 3–15 mm. wide, serrate, nerves prominent only beneath; peduncles 1.5–2 cm. long, articulate 5–6 mm. below the calyx, this patelliform, nearly medially 5-lobed, the lobes about 5 mm. long, 3 mm. wide at base, 1-nerved; corolla orange, 2 mm. long, glabrous, as the basally dilated half as long stamen-tube; styles 10; fruit depressed-globose, 8–10 mm. broad, the 10–12 1-seeded carpels tomentose, 5 mm. high, obtuse, the pergamentaceous endocarp hamulose-rugulose, the seed pubescent with appressed and spreading trichomes.—Type 1 meter high. Resembles and allied to *G. hermannioides* HBK. of Mexico but leaves and flowers different in size; the fruit however is similar; the seeds are disclosed by the dorsal dehiscence but are retained by the parchment-textured wing-like walls in the hamulately roughened dark endocarp, which probably serves as an aid to germination by water-absorption (Ulbrich).

Cajamarca: Between Shumba and Jaén, *Weberbauer 6189*, type.

Gaya peruviana Ulbr. Notizbl. Bot. Gart. Berlin 11: 540. 1932.

Branches few, acutely diverging, the younger as the lanceolate-subulate stipules and petioles sparsely pilose, these both to 3 mm. long; leaves lanceolate, truncate or subcordate at base, very acute at tip, entire or sometimes indistinctly serrate, 1.5–3 cm. long, 3–10 mm. wide, sparsely stellulate or pilose with simple trichomes above, tomentose beneath, the nerves there prominent; peduncles 1.5–2 cm. long, articulate, 5–8 mm. below the calyx, this tomentose, cleft more than medially, the acute lobes 3–4 mm. long, 2 mm. wide at base; flowers yellow, 8–10 mm. long, glabrous as all parts except ovary; fruit glabrescent, the 10–12 carpels 4 mm. high, 2–2.5 mm. wide, obtusish, the triangular seeds pilose only at the angles.—Type about 1 meter tall. Related to *G. aurea* St. Hil. with longer petioles, larger flowers and fruits (Ulbrich).

Piura: Shrubby grass steppes, 1,500 meters, (*Weberbauer 6363*, type).

Gaya triflora Hochr. Ann. Cons. Jard. Bot. Genève 20: 141. 1917.

Upper stems herbaceous, velutinous-tomentulose (toward tips slightly glandular) as the petioles (2–11 cm. long), leaves beneath and peduncles, these 3, or in fruit 6 cm. long; leaves cordate-ovate, acuminate, irregularly crenate-serrate, sometimes sub-trilobed, 7–15 cm. long, 4–8 cm. wide, in age above sparsely pubescent but velvety to touch, palmately many-nerved from base; flowers (2) 3 in each axil; calyx pubescent without, pilose within, the ovate lobes minutely acuminate, about 4 mm. long, 3.5 mm. wide at base, little accrescent in fruit; petals suborbicular, entirely glabrous, about 11 mm. long; stamen column scarcely 4 mm. long, glabrous but with a setose line around it at insertion with petals; fruit to 12 mm. across, the sparsely pilose carpels crescent-appendaged within and with large wings transversely 7–8-nerved and marginally dentate; seeds pilose except laterally nearly glabrous.—Remarkable in the 3 flowers in each axil (sometimes only 2), glabrous petals, line of trichomes encircling stamen column (author). The type was referred by Baker to *G. subbiloba* HBK. of Colombia, the flowers solitary and scarcely to be expected in Peru. F.M. Negs. 9404 (Dahlem spec.); 23691.

Amazonas: Chachapoyas, *Mathews*. Without locality, *Mathews 3236*, type.

Gaya Weberbaueri Ulbr. in Notizbl. Bot. Gart. Berlin 11: 541. 1932.

Yellowish velutinous-pubescent even to the calyces; stipules subulate, 2 mm. long; petioles 1.5–4 cm. long; leaves oblong-oval, finely serrulate, 2–4.5 cm. long, 2–3 cm. wide, nerves prominent beneath; peduncles 1.5–3.5 cm. long, articulate 5–10 mm. below the subcampanulate calyx, this parted nearly medially, the acuminate lobes 2.5 mm. long, 2 mm. wide at base; corolla orange, campanulate, about 10 mm. long, the obovate suborbicular petals sparsely fimbriate; ovary pilose; fruit semi-globose, 8–10 mm. broad, the 12 or more triangular-oblong carpels 4–5 mm. high, 2–2.5 mm. wide, dehiscing toward apex, yellowish as the rugulose endocarp, the 2 mm. long seeds minutely pilose only on angles.—Resembles *G. calyptrata* (Cav.) HBK. with shorter petioles, larger flowers, smaller fruits (Ulbrich). Apparently should be drawn to include *G. jaenensis* and *G. peruviana* (this not seen), but all three species ex char. similar to each other and to *G. aurea* St. Hil. Fl. Bras. Merid. 1: 193. 1827, from which species it may be noteworthy. Ulbrich gives,

for *G. peruviana*, only comparative differences commonly meaningless as indicators of genetic distinction; and *G. aurea* St. Hil. seems to have little to distinguish it from *G. hermannioides* HBK. and *G. canescens* HBK. Nov. Gen. & Sp. 5: 268, 269. 1822, both included by Hochreutiner in *G. calyptrata*, the former as a small-leaved variety; the problem however is beyond the scope of this work; it *was* Ulbrich's since he was proposing new names.

Cajamarca: Above Las Huertas, 1,100 meters, *Weberbauer 7118*, type.—Huánuco: Dry slopes, Huánuco, *2447* (distributed as *G. calyptrata*).—Junín: Tarma, *1008* (distr. as *G. calyptrata*); *Killip & Smith 21798*. La Oroya, *Kalenborn 130*.

19. CRISTARIA Cav.

Reference: Hochreutiner, Ann. Cons. Jard. Bot. Genève 21: 347–357. 1920.

Prostrate ascending often tomentose herbs with dissected or angulately lobed leaves, the flowers axillary or in terminal racemes. Bractlets none. Anthers clustered at apex of filament-tube. Ovary-cells many, 1-ovuled; style branches filiform, truncately or capitately stigmatose. Carpels in a carpocrater (cup formed by expansion of carpel and columella bases), uniseriate, usually produced at maturity into a pair of erect-conniving wings, the cells closed even in fruit or more or less opening bilaterally, the solitary seed pendulous or apically affixed horizontally.—Hochreutiner, Ann. Cons. Jard. Bot. Genève 21: 405–428. 1920, has considered the presence (to absence) of the apical carpel-wings as of secondary importance, the presence of a carpocrater being primary (Hochreutiner, l.c. 348–357); this structure, "aptly so designated by Hochreutiner and described by him in detail" (Kearney, Amer. Midl. Nat. 46: 95. 1951) is most typically and best developed in this genus where expanded separated bases of carpels become fused with the enlarged base of columella or receptacle to form a cupula around the lower part of the fruit. This student anticipated others by several years in observing, naming and describing this interesting development.

Indument hirsute; petals 8–10 mm. long . . . . . *C. divaricata*.
Indument stellate; petals 5 mm. long, or 12–17 mm. long.
Loosely branched; leaves dissected . . . . . *C. formulosa*.
Closely branched; leaves often trifid, lobes pinnate . . *C. multifida*.

Cristaria divaricata Phil. Anal. Univ. Chile 82: 312. 1892 (1893).

Much branched, hirsute, the trichomes in part simple; leaves suborbicular, trifid to base, the segments incised, with narrowly linear obtuse lobes; peduncles 2 in each axil, longer than the leaves; sepals densely villous, 4 mm. long; petals 8–10 mm. long.—The leaves are sometimes 9-lobulate; var. *hirsuta* Phil., entire plant white-hirsute. The Peruvian collection agrees with Reiche's description of Philippi's plant except 4 dm. high, petals 15 mm. long, pedicels mostly solitary (Bruns). It seems probable that the Peruvian specimen is referable to *C. formulosa* Johnst., or that the latter is synonymous with the present species.

Arequipa: Lomas, *Mexia;* (*Guenther & Buchtien 218*, det. Bruns). Chile.

Cristaria formulosa Johnst. Contr. Gray Herb. 85: 74. 1929.

Laxly ascending annual, the slender stipitately glanduliferous or sparsely stellate pubescent stems to about 5 dm. long, internodes 2–8 cm. long; stipules lanceolate, entire; petioles as long or longer than leaves, these dissected, often 3–5-foliolate, gradually reduced above, often pinnate with more or less remote lobules, the lower broadly ovate, often cordate or reniform, 3–7 cm. long, nearly as wide, lightly stellate pubescent; pedicels 1–3 cm. long; calyx 6 mm. long, the lobes broadly lanceolate; petals roseate, 12–17 mm. long; carpels 20–25, glabrate, wings oblong-ovate, 1.5–2 cm. long; seeds about 1.2 mm. high, 0.8 mm. wide.—Distinct by its loosely branched habit, dissected leaves (Johnston). Determinations by author.

Arequipa: Sand dunes of Mollendo, *Mexia 04183*. Silty flats below conglomerate bench near Mollendo, *Worth & Morrison 15727*. Chile.

Cristaria multifida Cav. Icon. 5: 11. Obs. 1799.

Erect, rarely 2 meters high, but the stems and branches arcuate-flexuose, sometimes forming small clumps, lightly pubescent with minute stellate trichomes or densely only on the calyces, these about 3 mm. long, nearly twice as long in fruit, the rotund ovate lobes acute; leaves broadly ovate to elliptic, often trifid, the lobes more or less deeply pinnate with short obtuse lobules; pedicels slender, soon 1.5–2.5 cm. long; flowers lilac or whitish; petals about 5 mm. long; fruits 7 mm. across, topped conspicuously at maturity by the papery carpel-wings.—F.M. Negs. 29765; 29767.

La Libertad: Ditch along railroad, Chicama Valley, *Smyth 54*. —Lima: Above Chosica, 1,700 meters, *Weberbauer 5318;* 144.

Lurín, on dryer sands toward the sea, *5938*. Near Lima, *Dombey*, type.—Arequipa: Tingo, 2,100 meters, *Cockerell; Pennell 13118*. Mollendo, *Hitchcock 22354*. Yura, *Cockerell*.—Moquehua: In hills near Moquehua, *Weberbauer 7444A*. Mt. Estuquina, 1,600 meters, *Weberbauer 7444*.

SIDA L.

Abutilothamnus Ulbrich, Notizbl. Bot. Gart. Berlin 6: 316. 1915, fide Hochreutiner.

Herbs or shrubs, often half-shrubs, the indument tomentose or hispid, the leaves usually serrate. Calyx bractlets none (at least in Peru) the calyx usually angled, the lobes erect or connivent over the fruit, sometimes much-accrescent. Ovary 5–many-celled, the cells 1-ovuled; stigmas apical. Carpels usually with 2 beaks, awns, cusps or bristles, sometimes greatly reduced or lacking, indehiscent, apically slightly 2-valved or sometimes opening irregularly at base, with no inner appendage, the seed pendulous or affixed horizontally, without envelope.—My indebtedness to Fawcett and Rendle's scholarly account of the species of Jamaica (Fawcett and Rendle, Fl. Jam. 5: 107–120. 1926) will be apparent as many of the widely distributed species are also in Peru; there is great need for a general revision. Most of the well-known species listed now from Peru are illustrated in Rodrigo's excellent account of the species of Argentina, Rev. Mus. La Plata n. ser. 6, Bot.: 81–212. 1944; the plates show habit, calyces, carpels and petals. For convenience the key is designed (it is hoped) for determination of the more common Peruvian species; even so, many are scarcely distinguishable especially when immature. I acknowledge my indebtedness to Fries, Sv. Vet. Akad. Handl. ser. 3. 24, no. 2: 18–19. 1947, for the synonymy and key to the species centering in *S. oligandra;* with accumulation of collections the species may be found to be fewer as some at least of the characters used as diagnostic are known to vary for better known forms, and except for Fries' publication I would have merged them into two or three (rather; to be regretted—B.P.G.H.).

Since this was written the species known also from Panama, the West Indies and North America have been keyed by Kearney, Leafl. West. Bot. 7: 138–150. 1954.

Leaves not lobed or obscurely and angulately, rarely subhastately.

Leaves 3 or more times longer than wide, or not at all cordate.

Margins of linear leaves quite entire.....*S. linifolia.*

Margins of leaves at least minutely crenate-serrate.
Prostrate, in age forming mats.....*S. ciliaris.*
Erect, more or less ligneous toward base.
Peduncles even in fruit rarely twice as long as calyces.
Leaves canescent puberulent at least beneath.
Flowers 2–2.5 cm. wide, rarely white or yellowish.
S. Weberbaueri.
Flowers much smaller, usually yellow or white.
Carpels usually 6 (5–10), the beaks retrorsely hispid.
S. salviaefolia.
Carpels always 5, the beaks puberulent..*S. spinosa.*
Leaves usually soon glabrate; carpels 7–12, the beaks puberulent.....*S. glomerata, S. acuta.*
Peduncles all or mostly soon more than twice as long as calyces.
Leaves subhastately lobulate; pedicels filiform.
S. Ruizii.
Leaves never subhastate.
Carpels always 5.
Petals white; carpels opening below.....*S. alba.*
Petals yellow; carpels opening above....*S. spinosa.*
Carpels 7–14.
Leaves usually glabrate; petals yellow or white; awns short; stamen tube mostly papillose.
S. acuta.
Leaves usually tomentulose beneath; petals yellow; awns about as long as body; stamen tube pilose.....*S. rhombifolia.*
Leaves about twice as long as wide, broadly ovate or subrotund, more or less cordate (unless *S. acuminata, S. cordifolia, S. grewiifolia*).
Leaves quite entire.....*S. grewiifolia.*
Leaves serrate-margined
Prostrate-ascending, herbaceous or suffrutescent.
Calyx after anthesis obviously accrescent; petals exserted.
S. macrodon.
Calyx not at all accrescent; petals little exserted.
S. veronicaefolia.
Erect, more or less ligneous, at least at base.

Flowers sessile or shortly pedicelled, rarely solitary.
Indument mostly hispid; carpels 5 ..... *S. urens.*
Indument tomentose; carpels 7–12.
Carpels long-awned ..... *S. cordifolia.*
Carpels awnless ..... *S. acuminata.*
Flowers long-pedicelled, mostly or all solitary.
Petals 4–5 mm. long; leaves pubescent both sides. *S. paniculata.*
Petals 1 cm. long or longer; leaves glabrate above. *S. chachapoyensis.*

Leaves at least medially lobed.
Stamen tube glabrous; anthers as carpels 5.
Carpel awns 4–6 mm. long.
Leaf-lobes lanceolate-ovate, acute. *S. lomageiton, S. oligandra.*
Leaf-lobes obtuse, suboblong, not narrowed at base. *S. patuliloba.*
Carpel awns about 14 mm. long ..... *S. lomana.*
Stamen tube pubescent, anthers 10–20; carpels 7–9.
Leaves lobed deeper than medially, the lobes narrowed to base; anthers 10 or 20 ..... *S. jatrophioides.*
Leaves lightly lobed, the lobes ovate; anthers 10 or 15. *S. lomageiton, S. palmata.*

Sida acuminata DC. Prodr. 1: 462. 1824.

Erect, branched, ligneous below, to about a meter high, the younger parts fulvous stellate tomentose especially the leaves beneath and the calyces; stipules linear, deciduous, about 1 cm. long; petioles 3–10 mm. long; leaves elliptic-lanceolate, somewhat cordate at base, acute or subobtuse, 3–6 cm. long, coarsely serrate; flowers 1-several in the axils, the pedicels usually short; calyx 4–5 mm. long, the tube not angled; carpels 7–12, not awned, dorsally rounded and stellate pubescent, reticulate on the inner sides.—The Lima specimen is the West Indies form (Ulbrich); it seems probable that the single Peruvian record was a casual introduction (surely—H.).

Lima: Near Lima in 1831, *Meyer*. Northern South America; West Indies.

Sida acuta Burm. Fl. Ind. 147. 1768. *S. carpinifolia* L. f. Suppl. 307. 1781, fide Hochreutiner.

Erect-ascending or subprostrate, branching, the usually minute indument of younger stems, petioles (4–5 mm. long), peduncles and calyces stellate and simple; stipules 1–1.5 cm. long, sublanceolate to linear; leaves oblong-lanceolate to ovate, the larger oblique, rounded to cuneate at base, 1.5–7 (9) cm. long, irregularly serrate, mostly 3-nerved, early pubescent as petioles, later glabrate; flowers at first solitary, later with a flowering branch and subsessile, becoming more or less capitately or umbellately disposed; calyx 6–8 mm. long, 10-nerved, the lobes acuminate, exceeded by the yellow petals; carpels 7–12, 3–4 mm. long, laterally reticulate, dorsally ridged, apically shortly rostrate and puberulous; seeds puberulent only at hilum.—The var. *hispida* Schum. has longer indument, in part. Determinations by Standley. Illustrated, Rev. Mus. de La Plata, n. ser. 6, Bot. 7: 156. F.M. Negs. 7558; 9368 (var.).

A weedy shrub used for brooms, often a meter or so high, with orange, rarely white, flowers.

Junín: Perené Bridge, *Killip & Smith 25315*. Puerto Yessup, *Killip & Smith 26334*.—Loreto: Iquitos, *Williams 7968*. Florida, *Klug 2088*.—Huánuco: Tingo María, *Allard 20566*.—Cuzco: In hedges, Urubamba Canyon, *Vargas 11063*. Santa Ana, *Cook & Gilbert 1434*.—Puno: (*Lechler 2398*, type, var. *hispida*). Old and New World Tropics. "Jocuchuchupa" (Cook & Gilbert).

Sida alba L. Sp. Pl. ed. 2. 960. 1763. *S. angustifolia* Mill. Gard. Dict. ed. 8. 1768.

Finely stellulate pubescent, becoming glabrate on the leaves beneath, also more or less tomentulose; stipules 3–7 mm. long, subulate; petioles to 2.5 cm. long, mostly much shorter; leaves broadly ovate to narrowly ovate-lanceolate, serrate, 5-nerved, mostly 2–4 cm. long; peduncles about 1 cm. long; early flowers solitary, the later approximate or short-racemose often followed by a floriferous branchlet; calyx of *S. spinosa;* petals white; carpels 5, puberulent including the 2 short beaks, 2 mm. long, whitish, membranous, irregularly dehiscing below; seeds trigonous, about 2 mm. long.—This is probably a variety of *S. spinosa* L. (B.P.G.H.), which is also my impression.

Peru (probably). Tropical America; Africa; India.

Sida chachapoyensis Baker, Journ. Bot. 30: 324. 1892.

Ligneous, erect, the petioles, these 2–2.5 cm. long, and slender medially articulate peduncles furfuraceous pubescent; leaves oblong

or ovate, cordate or subcordate at base, acuminate, 6–10 cm. long, nearly glabrous above, pubescent beneath; flowers axillary but paniculate in the upper axils; petals bilobed, nearly 13 mm. long, much longer than the calyx; carpels 5.—Section uncertain (Baker).

Amazonas: Sesuya, Prov. Chachapoyas, (*Mathews 3049*, type).

Sida ciliaris L. Syst. Nat. ed. 10. 1145. 1759.

Prostrate perennial, the spreading 1–several dm. long stems somewhat ligneous toward the base, glabrate, the young branches more or less pubescent with stellate or forked trichomes, the oblong-elliptic to obovate leaves often with simple pubescence above, usually about 1–1.5 cm. long, the petioles not longer; stipules ciliate, linear-lanceolate; peduncles adnate to the petiole of the foliose bract, terminal, with usually several (–8) umbelliform flowers; calyx hirsute, 4–5 mm. long or longer, the red petals 6–7 mm. long; carpels commonly 5–6 (–8 in type), about 2 mm. long, tuberculate-spiny; seeds appressed puberulent, about 1.5 mm. in diameter.—The leaves are serrate only above the middle. Collected in adjacent western Ecuador. Illustrated, Rev. Mus. La Plata n. ser. 6, Bot. 96. F.M. Neg. 19684 (var.).

Peru (probably). To Mexico, Paraguay and the West Indies.

Sida cordifolia L. Sp. Pl. 684. 1753.

Herb or half-shrub commonly a meter or more high, softly canescent tomentose occasionally also with some longer indument, finally glabrate below; stipules filiform, 5 mm. long or longer; upper petioles usually about half as long as the leaves, these usually subcordate-ovate, obtuse or acute, mostly 3–6 cm. long, serrate, about equally tomentose both sides; flowers in terminal and axillary dense racemes or corymbs, rarely solitary in the axils, the articulate peduncles often exceeding the petioles; calyx 6–7 mm. long; petals about 1 cm. long, yellow, orange or red-veined; carpels 7–12, 3–4 mm. long, reticulate, dehiscing at apex, this usually provided with 2 long spine-like retrorsely hispid awns; seeds glabrous except at hilum, about 2 mm. long.—Determinations by Standley. In spite of the name leaves are rarely cordate, usually subcordate or rounded (B.P.G.H.). Illustrated, Mart. Fl. Bras. 12, pt. 3: *pl. 62*.

The fiber which the plant contains is said to be so excellent that its cultivation could be exploited.

San Martín: Tarapoto, *Williams 5397; 6736*. Juanjuí, *Klug 3928* (det. Standley).—Junín: La Merced, *5455*.—Loreto: Yuri-

maguas, *Poeppig 2076; Williams 3919; 3996; 4146; 4347; 7846.* Balsapuerto, *Klug 2876.* Río Paranapura, *Klug 3928.*—Cuzco: Prov. Anta, *Vargas 147.* Prov. Convención, *Weberbauer 7948.* Widely distributed in warm regions. "Caballo usa," "sinchi-pichana" (Williams).

Sida glomerata Cav. Diss. 1: 18, *pl. 2.* 1785.

Erect, branching, ligneous below, the younger stems and petioles, these 5–7 mm. long, puberulent; stipules persisting, lanceolate, acuminate, glabrous but ciliate, 8–10 mm. long; leaves lanceolate subrhombic, narrowed both ends or truncate to subcordate at base, usually 3-nerved; flowers terminal and axillary, sessile or nearly, often globosely capitate mixed with stipular bracts; calyx hispid on the 5 angles and 10 nerves, 5–7 mm. long, the lobes acuminate; petals yellow or white; carpels 5, glabrous, reticulate, cuspidate, 2 mm. long, the seeds puberulent only near the hilum.—Type, *Jussieu,* without locality, Peru. Probably, practically, a variety of *S. acuta* (B.P.G.H.). Determinations by Standley.

In Peru as elsewhere commonly used as a broom; the mucilaginous sap is reported to serve as soap.

San Martín: Chazuta, *Klug 4137.*—Junín: La Merced, *Killip & Smith 23555* (det. Killip).—Loreto: Mishuyacu, clearing, *Klug 210.* Yurimaguas, *Williams 3966; 4363.* Río Itaya, *Williams 3235.* Río Nanay, *Williams 332.* Iquitos, *Williams 1306; 1362; 3546.* Tropical America. "Sinchi-pichana" (Klug).

Sida grewiifolia (Ulbr.) Hochr. comb. nov. in herb. *Abutilothamnus grewiifolius* Ulbr., Notizbl. Bot. Gart. Berlin 6: 316. 1915.

Branches few, strict, terete, then stout, the younger as the petioles, these mostly 1–1.5 cm. long, leaves beneath and calyces brownish puberulent-tomentose; stipules linear-lanceolate, about 1 cm. long, promptly caducous; leaves entire, oblong-ovate, those of the primary branches 1.5–2 dm. long, 6–10 cm. wide or larger, of the axillary flowering branchlets to 8 cm. long, 2–3 cm. wide, the 3–5 palmate nerves prominent both sides; peduncles 4–10 mm. long, articulate 1–3 mm. below the calyx, this 4 mm. long, its lobes broadly ovate or suborbicular, half as long; petals oblong-obovate, spreading, 6–7 mm. long, barbate at base, adnate to very short stamen tube about half its length; styles filiform, about 15, stigmas depressed-capitate; fruit black, the 15–20 uniseriate acute carpels separating from axis, dehiscent dorsally, nearly 1.5 mm. high,

hispid-tomentose, the single subglobose seed nearly 1 mm. thick, villous.—Type a shrub or tree 3–10 meters tall; fruit similar to that of *Abutilon* but the solitary pendulous ovule allies the genus to *Sida* (author). I cannot understand why this is not considered a *Sida;* here is no true argument for a new genus; there is a lot of variation in the organization of ovules, often inside of one flower (B.P.G.H.).

Río Acre: Monte Alegre, Seringal San Francisco, *Ule 9589*, type.

Sida jatrophioides L'Hér. Stirp. Nov. 5: 117, *pl. 56*. 1789. *S. rupo* Ulbr. Bot. Jahrb. 54: Beibl. 117: 75. 1916, fide Clement, in herb.

Slender, sparsely branched annual, only the upper stems, petioles (4–10 cm. long), and lax (in fruit) panicle branches densely setulose and somewhat stellate, or glabrescent except the calyces; leaves few, subbasally or more than medially 5–7-lobed, suborbicular, the lower to about 1 dm. wide, the uppermost more or less reduced, early, especially beneath, sparsely stellulate and setulose, the lobes somewhat narrowed toward base, irregularly serrate and often incised, acute or subobtuse; pedicels in fruit several mm. to 10 or more long; calyx about 5 mm. long, somewhat accrescent, villous-setulose, the ovate-lanceolate lobes acuminate; corolla purple, subcylindrical, the glabrous obtuse petals 6–7 mm.(?) long; stamen tube rather densely villous-stellate; anthers 20 or 10 (*S. rupo*); ovary glabrous as styles, these 2.5 mm. connate; carpels 5–8, rugulose, with 2 apically retuse hispidulous awns about 5 mm. long, the single obliquely ovoid seed nearly 2.5 mm. long (after Ulbrich as to fruit).—The awns are often broken off or deciduous. Ulbrich separated his species on the basis of the villous stamen tube; however, according to the characterization of the type the tube is villous; in any event the character above is of questionable specific value. R. E. Fries, however, maintains the species; the latter's *S. decandra*, Sv. Vet. Akad. Handl. ser. 3. 24, no. 4: 16. 1947, from Chimborazo has the long carpel awns of *S. lomana* but the 10 anthers of *S. rupo;* the constancy of these characters remains to be proved.—Illustrated, Cav. Diss. 5: *pl. 131, fig. 3* (as *S. palmata*), fide Fries; Jacq., Icon. Rar. 3: *pl. 547;* L'Héritier, l.c., *pl. 56*. F.M. Negs. 21604; 29786; 9802 (both as *S. palmata*); 9381.

Lima: Chancay, *Dombey*, type. San Bartolomé, (*Asplund 10810*, det. Fries). San Augustín Lomas, *Weberbauer 5247*.—Ica: Pampano to Huaytara, 1,700 meters, *Weberbauer 5392* (type, *S. rupo*).—Moquehua: Toward Torata, *Weberbauer 7427* (det. Ulbrich, *S. rupo*). Lomas de Molenca, (*Espoto 21*, det. Ulbrich, *S. rupo*).

Sida linifolia Juss. ex Cav. Diss. 1: 14, *pl. 2, fig. 1.* 1785.

Erect herb or becoming ligneous below, rarely a meter high, with linear, quite entire leaves, the flowers mostly in dense terminal corymbs, the rather sparse appressed indument in part simple; petioles as the linear stipules about 4–7 mm. long; leaves 5–15 cm. long or longer, only a few mm. wide; calyx hirsute, the lobes acute, about 5 mm. long, the petals to nearly twice as long, white with purple bases, purple or yellow; carpels 7–9, glabrous, obscurely cornute, 2.5 mm. long; seeds glabrous, scarcely 2 mm. long.—Determinations by Standley. Illustrated, Mart. Fl. Bras. 12, pt. 3: *pl. 57.*

San Martín: Tarapoto, *Williams 5429; 5847; 5901.* San Roque, *Williams 7279; 7493.* Lamas, *Williams 6454.* Without locality, according to Cavanilles, *Jussieu.* Tropical America and Africa.

Sida lomageiton Ulbr. Bot. Jahrb. 54: Beibl. 117: 73. 1916.

Annual; stipules to 2 mm. long, caducous, hirsute; petioles about 2 cm. long, hirsute and tomentose; leaves about 5 cm. long and wide, nearly medially 3-lobed, irregularly serrate, the ovate lobes acute, tomentose both sides; flowers more or less paniculate at the ends of short slender axillary branchlets; pedicels 2–5 mm. long, elongating to 1 cm. or more after anthesis; calyx about 6 mm. long, villous, subglabrous within, lobes ovate-lanceolate, 3 mm. long; petals purple, stellate puberulent toward obtuse apex; stamen tube covered below, 3 mm. long, glabrous as styles, these nearly 0.5 mm. connate, and depressed-capitate stigmas; carpels 5, clavate-pyriform, 4.5 mm. long, rugulose, glabrous as the 4 mm. long awns and the large solitary seed except at the hilum (after Ulbrich).—Not seen by Fries, apparently referred by Clement (in herb.) to *S. jatrophioides,* but suggested by Fries as possibly a part of *S. oligandra;* however, it closely resembles *S. palmata* vegetatively and Hochreutiner asks: is it not that species? That is my impression but apparently Johnston and Clement don't think so. F.M. Neg. 9383.

Lima: Lomas, San Augustín, *Weberbauer 5240,* type. Ambar to Huacho, 1,200 meters, *Stork 11470* (det. Johnston). Santa Clara, *Rose 18619* (det. Clement).—Arequipa: Posco, *Cook & Gilbert 49* (det. Ulbrich).

Sida lomana Bruns, Mitt. Inst. Allgem. Bot. Hamb. 58. 1929.

Sparsely branched annual with indument of stellate and simple trichomes, the latter most abundant on the petioles (4–10 cm. long),

stems above and calyx lobes; stipules 5 mm. long; leaves cordate, deeply 5-lobed, the ovate lobes irregularly subcrenate-serrate (or obscurely), scarcely acute, sparsely pubescent with simple trichomes both sides; flowers many, in dense panicles in the upper axils, the pedicels to 2 cm. long (5 cm. in fruit); calyx campanulate, 4 mm. long (8 mm. in fruit); the lobes 3 mm. long, hispid; corolla 6 mm. long, stellate puberulent apically; stamen tube 5 mm. long, glabrous as ovary, the 5 styles 4 mm. long; carpels obliquely pyriform, 5 mm. long, glabrous, rugose, with 2 spreading awns 14 mm. long, these retrorsely flavescent pilose except toward base; seeds 2.5 mm. long. —Nearly *S. oligandra* as suggested by the author, but distinct by the long awns. Illustrated, Bruns, l.c. 59. F.M. Neg. 20925.

Arequipa: Lomas, Paseo, (*Guenther & Buchtien 193*, type; *194b*). Mejía, (*Guenther & Buchtien 194; 194a*).

Sida macrodon DC. Prodr. 1: 464. 1824. *S. physaloides* Presl, Rel. Haenk. 2: 105. 1835, fide Schumann. *S. intermedia* St. Hil. Fl. Bras. Merid. 1: 188, *pl. 36*. 1827, fide Schumann.

Small, prostrate, suffrutescent, the many simple branches a dm. or two long, early puberulent tomentulose and with some longer spreading trichomes, glabrate in age; stipules 3–4 mm. long; petioles 2–2.5 cm. long; leaves subrotund or broadly ovate, cordate at base, obtuse, rather coarsely serrate crenate, stellate pubescent especially beneath, usually 1.5–2 (4) cm. long and about as wide; peduncles 2–2.5 cm. long, solitary or binate, slender; calyx subpentagonous, canescent, soon 6–8 mm. long, 1.5 cm. long or longer in fruit; petals 8–12 mm. long, pilose at base, roseate or purple; stamen tube 3–4 mm. long, pilose; carpels glabrous, 2.5 mm. long, muticous, the epicarp fragile, tardily dehiscent; seeds smooth, glabrous.—After Schumann. Carpels said to be only 5 in the Haenke type, 6–11 in the plant of DeCandolle according to R. E. Fries, Sv. Vet. Akad. Handl. ser. 2. 42, no. 12: 36. 1908, but otherwise ex char. there seems to be only one species; DeCandolle wrote "10" and Hochreutiner has kindly looked at the type and noted about 8 visible, so the number 5 for the Haenke plant could easily be an error; of course, if preferred, the name of Presl may be used for the plant of Peru until more material shows the character constant or variable. F.M. Negs. 7995; 32641 (*S. physaloides*).

Huánuco: Near Huánuco, (*Haenke*, type, *S. physaloides*). Southeastern South America.

Sida oligandra K. Schum. in Mart. Fl. Bras. 12, pt. 3: 321. 1891.

Annual or enduring and lignescent toward base, sometimes a meter high or higher, glabrate below, shortly stellate and simply hispid above or the leaves merely stellate pubescent especially beneath; stipules filiform, caducous, 5–7 mm. long; petioles 3–5 (or lower to 8) cm. long; leaves more than medially 3–5-lobed, the upper 3–6 cm. long and broad, the lobes about lanceolate, attenuate to base, acutish; panicles ample, the pilose peduncles 1.5–3 cm. long; calyx campanulate, subtomentose, 5–6 (–8 in fruit) mm. long, the lanceolate lobes acute; petals 5–6 mm. long, marginally stellate above; stamen tube glabrous, anthers 5; carpels trigonous, dorsally muriculate, 3–4 mm. long, the pilose awns 6 mm. long, the tuberculate seeds 2 mm. long.—F.M. Neg. 9388.

Cajamarca: Cascos, Cerro de Catache, *Raimondi* (det. Ulbrich). —Cuzco: Calca, *Raimondi* (det. Ulbrich). Ecuador; Bolivia.

Sida palmata Cav. Diss. 1: 20, *pl. 3*. 1785, not 5: 274, *pl. 131*. 1788, fide Fries. *S. ricinoides* L'Hér. Stirp. Nov. 5: 115, *pl. 55*. 1789.

Annual or more enduring and lignescent at base, to a meter high or higher, stellate-tomentose above; stipules filiform, caducous; petioles about as long as the leaves, these to a dm. or so long, somewhat broader, glabrous or nearly above, more or less stellate-tomentose beneath, angulately 5–7 lobed, the lobes ovate, serrate; panicles ample, the peduncles to 1 cm. long or longer in fruit; calyx stellate-hirsute with some long simple trichomes above, 5–7 mm. long including the lanceolate deltoid acute lobes, these equaled by the obovate rounded red-violet petals, accrescent in fruit; stamen tube hirsute toward the little enlarged base, 3–4 mm. long; anthers 10 or 15; ovule pendent; carpels 7, semiorbicular, glabrous, rugose, sulcate dorsally, 3 mm. long, the slender rigid retrorsely setulose awns 4–5 mm. long.—After Fries as to flowers and fruits, based on Asplund Ecuadorean collections. I doubt if *S. lomageiton* is separable. As observed by Fries, earlier students have shown that the date of L'Héritier's work was actually 1789, not 1785 as printed. F.M. Negs. 29785; 7998.

Lima: Near Lima, *Dombey*, type (also of *S. ricinoides*).—Cajamarca: Cascas, *Raimondi* (det. Ulbrich). Ecuador.

Sida paniculata L. Syst. Nat. ed. 10. 1145. 1759. *S. floribunda* HBK. Nov. Gen. & Sp. 5: 258. 1822, fide Fawcett & Rendle.

Ligneous below, early yellowish stellate-tomentose, often about a meter high; stipules filiform, 5–8 mm. long; upper leaves shortly

petioled, to about 5 cm. long, ovate, cordate, more or less acuminate, unevenly serrate, somewhat puberulent stellate above, tomentulose beneath; first flowers solitary, the later disposed on branchlets in each axil forming in age ample terminal leafy panicles, the pedicels filiform, elongate; calyx 2.5–3 mm. long, the lobes subacute; petals dark purple or maroon, 4–5 mm. long; carpels five, 2.5–3.5 mm. long, dorsally stellulate, acute or minutely cusped or biaristate; seeds sparsely appressed puberulent, 1.5 mm. long. The var. *rufescens* Baker, Journ. Bot. 30: 295. 1892, refers to the leaf-color of a variant. Illustrated, HBK., Nov. Gen. & Sp. 5: *pl. 473* (as *S. floribunda*); Rev. Mus. de La Plata n. ser. 6, Bot.: 120. F.M. Neg. 9801 (*S. floribunda*).

Common food plant of *Dysdercus* (the "cotton-stainer") and scourge of the cotton grower (Smyth).

Libertad: Trujillo, *Killip & Smith 21520* (det. Killip). Chicama Valley, *Smyth 43; 15*.—Lima: San Lorenzo near Callao, *Gaudichaud 24; Andersson*. Near Lima, *Wilkes' Exped.* Chosica, *508*.—Cuzco: Río Vilcanota, *Mexia 8049* (det. Killip). Guillabamba, *Marin 1648*. West Indies; Mexico; South America; Africa. "Escoba."

Sida patuliloba R. E. Fries, Sv. Vet. Akad. Handl. ser. 3. 24 no. 2: 15, *pl. 1, figs. 4–6*. 1947.

Erect annual, the new branchlets densely pubescent with short simple trichomes and some longer (1–1.5 mm. long) spreading setae; stipules linear-subulate, 2–4 mm. long; petioles slender, rigid, to 4 cm. long, shorter above; leaves 3–8 cm. long and little wider, openly cordate at base, more than medially triparted, the oblong lobes obtuse, the lateral of the larger leaves with 1 lobule, little if at all narrowed to base, coarsely crenate-serrate, laxly and shortly stellate-hirsute above with some decumbent simple trichomes intermixed, more densely stellate beneath; flowers in ample leafy terminal panicles, the pedicels to 2 cm. long or longer in fruit, densely hirsute as calyces, these 3–4 mm. long, to 9 mm. long in fruit, the narrow lobes acute; petals red, 4 mm. long, stellate-hirsute without at apex; stamen tube glabrous, 1.5–2 mm. long; anthers, styles and carpels 5, the latter 3 mm. long, dorsally tuberculate, glabrous except the retrorsely spinulose rigid yellowish awns, these 4–5 mm. long.—Distinguished by author from *S. lomageiton* as indicated in key and from *S. lomana* further in shape of leaves and smaller fruit. It (as *S. lomageiton*) may prove to be a variant of *S. oligandra*. Determinations by Clement.

Lima: Shale slope, Matucana, *161* (det. Johnston, *S. oligandra*). Matucana, in rocks, *102* (det. Johnston, *S. lomageiton*, leaf-form); (*Asplund 11242*, type). Canta, *Pennell 14597*, and rocky slopes near Viscos, *14474* (both det. Johnston, *S. lomageiton*).

Sida rhombifolia L. Sp. Pl. 684. 1753.

Ordinarily much branched, somewhat ligneous below, minutely stellate puberulent above; stipules linear, as long or longer than the petioles (3–5 mm.); leaves oblong to lanceolate or rhomboid, crenate to entire at base, 3-nerved, tomentose beneath, crenulate toward the acute or obtuse tip, usually 5–6 cm. long; peduncles (1) 2.5–3 (4) cm. long, articulate above the middle, mostly solitary, rarely on a secondary branchlet or corymbose at tip; calyx 6–7 mm. long, 10-angled, the lobes acute; petals yellow or with red-purplish base, exceeding calyx, retuse; carpels (7) 10–14, the 1 or 2 awns (sometimes reduced) glabrous or puberulent; seeds brown, subcaudate, puberulent only at hilum.—A very variable cosmopolitan weed (Hochreutiner). Three variants in Peru are of little interest: var. *surinamensis* (Miq.) Schum. in Mart. Fl. Bras. 12, pt. 3: 329. 1891, var. *guazumifolia* (Klotzsch) Schum., l.c., and var. *Poeppigiana* Schum., l.c. Determinations by Standley except as noted. Illustrated, Amer. Journ. Bot. 33: 468, *fig. 3;* Mart. Fl. Bras. 12, pt. 3: *pl. 63*. F.M. Negs. 7985 (var.); 9396 (var.).

Contains much cellulose and as *S. cordifolia*, said to be sometimes cultivated.

Cajamarca: Tambillo and Cascas, Prov. Cutervo, *Raimondi* (both var. *guazumifolia*, det. Ulbrich).—San Martín: Boquerón, *Allard 22072* (det. Lyman Smith). San Roque, *Williams 7333*. Zepelacio, *Klug 3606*. Tarapoto, *Woytkowski 35100* (det. Cuatrecasas).—Huánuco: Pozuzo, *4557* (det. Blake). Mito, *1562*. Near Huánuco, *Sawada 66; Kanehira 272* (det. Johnston). Chinchao, *Mexia 04149* (det. Johnston).—Junín: La Merced, *Killip & Smith 23787*. Puerto Yessup, river thickets, *Killip & Smith 26334* (det. Ulbrich).—Lima: Chosica, *Mexia 04094* (det. Johnston); *Soukup 2052*. Matucana, *383*. Río Rimac Valley, *Ball.*—Loreto: Yurimaguas, *Williams 3843; 4441; 4481; 5106*. Río Nanay, *Williams 253; 570*. Near Iquitos, *Williams 1303; 1317; Klug 435; 1328; Williams 1356* (var. *surinamensis*, det. Ulbrich). Pro- and Caballo-cocha, *Williams 1968; 20366* (both det. Ulbrich, var. *surinamensis*).—Cuzco: Guillabamba, *Soukup 201*. Machupicchu, *Vargas 527*.—Puno: Aconeque, *Metcalf 30577* (det. Leonard). Near Puno, *Soukup 461*. All warmer regions.

Sida Ruizii Ulbr. Bot. Jahrb. 42: 122. 1908.

Erect terete branches early sub-scabrous with minute stellate trichomes; stipules subulate; petioles 0.5–2 cm. long; leaves lanceolate-rhomboid, sometimes subhastate, acute, 2.5–4.5 cm. long, about 1.5–2 cm. wide, unequally and coarsely repand-dentate, densely tomentose both sides with appressed stellate trichomes; peduncles slender, 2–4 cm. long, articulate 10–13 mm. below the stellate-glandular calyx; petals broadly ovate, obtuse, truncate or subemarginate, 6–7 mm. long, 4–5 mm. wide, barbulate at base; stamen tube 3 mm. long, filaments about 2 mm. long; carpels 5, broadly ovoid, 3 mm. high, with beaks 0.5 mm. long, dorsally densely, laterally microscopically stellulate, the central axis 3–3.5 mm. high. —Type a scrap without data but probably from Peru and related to *S. chapadensis* K. Schum. of Brazil (Ulbrich). F.M. Neg. 9393.

Lima: Chancay, *Ruiz (& Pavón)*, type.

Sida salviaefolia Presl, Rel. Haenk. 2: 110. 1835.

Erect perennial herb or flowering as an annual, the stems and leaves especially beneath tomentulose including the calyces; stipules filiform; petioles about 1 cm. long or the upper shorter; leaves oblong or ovate-oblong to lanceolate, subcuneate at base, unevenly serrate, often about 3.5 cm. long, 1–1.5 cm. wide, reduced above; flowers solitary or 2 or crowded toward the tips of the stems; peduncles somewhat longer than petioles; calyx 5–6 mm. long, the lobes acute; petals yellowish or white with red veins or red at base, not or scarcely exceeding calyx; carpels about 2–2.5 mm. long (without beaks), typically 6 (5–8), glabrous or dorsally puberulent toward the retrorsely hispidulous awns, these about as long or shorter than the muricate body of the carpels.—Carpels 5–8, nearly black, with 2 retrorse barbs of varying length terminating the beaks; lateral ribs form spinose projections (Svenson, Am. Journ. Bot. 33: 466–467. 1946), who referred the Peruvian plant with some doubt to *S. campestris* Benth. of Ecuador, with about ten carpels and simple trichomes on the stems. Actually it seems to be as similar to the Presl plant, and the name of that, being earlier, is used here. Furthermore, Fries, Sv. Vet. Akad. Handl. ser. 3. 24, no. 2: 13. 1947, placed here *Asplund 5623* from Salinas, Ecuador, which in all probability is the same, noting however the carpel awns as 0.5–0.75 mm. instead of 2–2.5 mm. long as in type; moreover, Svenson observed variations in awn-length. This presumably is var. *submutica* J. T. Howell, Leafl. West. Bot. 6: 169. 1952, of the Galapagos,

the carpel awns 1 mm. long or at most half as long as the body of the carpel. I follow Baker f. who considers it a variety of *S. spinosa*, which is again a cosmopolitan weed with innumerable variations—B.P.G.H. This would be my preference but in this work I try to present problems rather than to impose decisions. Illustrated, Svenson, l.c. 408, fig. 1 (as *S. campestris*).

Piura: Quebrada Mogollon, Amotape Hills, (*Haught & Svenson 11521A*). Ecuador; Galapagos Islands.

Sida spinosa L. Sp. Pl. 683. 1753. *S. angustifolia* Lam. Encycl. 1: 4. 1783, fide Fawcett & Rendle.

Stellulate puberulent-tomentose to glabrate (in age) perennial herb usually less than 1 meter high, the yellow flowers solitary in the axils or on a subsidiary branchlet, less frequently corymbose; stipules subulate, 5–9 mm. long; petioles to 2 cm. long, often with 1–2 tubercles or small spines just below the base; leaves ovate-elliptic to narrowly lanceolate, usually truncate or rounded at base, softly tomentose beneath, crenate-serrate, 1–3 (4) cm. long; calyx 5–7 mm. long, tomentose, 10-nerved, 5-angled, with deltoid acute lobes, petals about as long or somewhat longer; carpels 5, brown, coriaceous, 2.5–3.5 mm. long, antrorsely puberulent toward apex (where dehiscing) including the 2 short spines, dorsally rugose-reticulate, glabrous; seeds trigonous, about 2 mm. long.—The Peruvian collections if correctly determined may have been casual introductions, but the range of the species is wide. The var. *angustifolia* (Lam.) Griseb. is said to be a form with subcuneate based leaves. Probably should be drawn to include as variants *S. alba* and *S. salviaefolia* which compare. Illustrated, Amer. Journ. Bot. 33: 468, *figs. 2, 4.*

Lima: Callao, *Wilkes' Exped.*—Apurímac: Edge of cultivation, *Goodspeed Exped. 10574* (det. Standley). To eastern North America.

Sida urens L. Syst. Nat. ed. 10. 1145. 1759. *S. pseudo-urens* Baker, Journ. Bot. 30: 294. 1892.

Perennial, erect or the slender branches often sprawling, notably yellowish-brown hirsute, even to the 5 calyx angles, with long simple trichomes and with some shorter stellate indument, this mostly on the membranous leaves; stipules linear, 3–5 (6) mm. long; petioles 1–2.5 cm. long; leaves ovate or oblong-ovate, cordate, acute or acuminate, serrate, the 5–7 nerves, especially beneath, pubescent, usually about 5 or 6 cm. long; flowers sessile or shortly peduncled,

often several in dense clusters, axillary or later sometimes disposed in terminal heads or spikes with 1 or 2 foliose bracts; calyx 6–8 mm. long, the acuminate lobes usually slightly exceeding the yellow, usually red-blotched petals; carpels five, 2 mm. long, glabrous, bicuspidate.—Ex char., the plant of Baker seems to have no distinguishing marks unless it lacks the hirsute indument mentioned only for the calyx, the pubescence elsewhere apparently "rufostellate," thus suggesting *S. aggregata* Presl of more northern range. Your reduction is quite right (B.P.G.H.). Illustrated, Mart. Fl. Bras. 12, pt. 3: *pl. 60.*

Huánuco: Pozuzo, *4669.* Chanchamayo Valley, *Schunke 537; 538.*—Junín: La Merced, *5389.*—Loreto: Aguaitia, *Woytkowski 34434.*—Cuzco: Marcapata, *Herrera 1158.* Tropical America; Africa; Java.

Sida veronicaefolia Lam. Encycl. 1: 5. 1783. *S. repens* Dombey ex Cav. Diss. 1: 7, *pl. 3, fig. 2.* 1785. *S. Dombeyana* DC. Prodr. 1: 463. 1824. *S. veronicaefolia* Lam. var. *Dombeyana* (DC.) Baker, Journ. Bot. 30: 293. 1892.

Prostrate-ascending, sometimes becoming lignescent at base, more or less spreading, pilose-hirsute or glabrescent; stipules subulate-filiform; petioles about as long as the leaves, these cordate-subrotund, obtuse or acute, serrate, mostly 2–3 cm. long and wide; peduncles almost filiform, solitary or 2–3 in the axils, commonly longer than the reduced upper leaves; calyx angulately pentagonous, 4–5 mm. long, the basally ovate lobes acute, ciliate, the slightly longer petals yellowish with purple lines; carpels 5, reticulate, about 3.5 mm. long, muticous (?) or more or less birostrate.—Schumann in Mart. Fl. Bras. 12, pt. 3: 319. 1891, employs the name of Lamarck from the East Indies for this apparently variable or not understood plant and quite possibly there is only one species concerned. However, ex char., the plant of Lamarck being erect with geniculate peduncles and lanceolate calyx lobes seems possibly distinct. Apparently the Peruvian names apply to the same species, in spite of the fact that the carpels seemingly may be little muticous or aristate (Cavanilles). Apropos, Hochreutiner has added: it is certain that you are right and the proof that Lamarck's name is prior is that Cavanilles has cited it along side *S. repens* in his book, 1: 7. 1785; a cosmopolitan weed as far as I know and therefore very variable. Illustrated, Hook. Bot. Misc. 2: 209, *pl. 89* (*S. Dombeyana*). F.M. Negs. 29787; 29795 (as *S. veronicaefolia*).

Cajamarca: Huancabamba, *Weberbauer 7111.*—Lima: River bed, Obrajillo, *Wilkes' Exped.* Near Lima, *Jos. de Jussieu,* type; *Dombey* (carpels rostrate). South America?

Sida Weberbaueri Ulbr. Bot. Jahrb. 54: Beibl. 117: 68. 1916.

Erect grayish annual (or persisting and more or less lignescent?), the branchlet tips and leaves more or less tomentose becoming glabrescent; stipules persisting, linear, fimbriate, to 1 cm. long; petioles 1–2 cm. long; leaves lanceolate-ovate, cordate, obtuse or subcuneate at base, acute, 4–7 cm. long, about 1–2 cm. wide, serrate, the pinnate nerves prominent beneath; flowers 2–2.5 cm. across, mostly solitary in the axils; pedicels 2–6 mm. long, articulate 1–2 mm. below the 5-angled calyx, the acute slightly fimbriate lobes glabrous only within; petals oblong-spathulate, white to pink, purplish or dark red, rarely yellowish within toward base, minutely ciliolate, 7–8 mm. long; stamen tube 2.5 mm. long, stellulate; fruit included in calyx, subglobose, 4 mm. high, nearly glabrous, brown, the mostly 7 carpels 3.5 mm. high, compressed, trigonous, laterally transversely rugulose and somewhat reticulate, tardily separating, shortly beaked, the solitary seed glabrous.—Allied to *S. acuta* with shorter peduncles and petioles, longer stamen tube, different fruit characters (Ulbrich). Very likely a form of *S. acuta,* that cosmopolitan weed with innumerable variations (B.P.G.H.). Flowers of *Horton 11574* noted as "cream yellow." Illustrated, Svenson, Amer. Journ. Bot. 33: 468. *fig. 5.*

Piura: Rocky slopes, Cerro Prieto, (*Haught & Svenson 11582*). Hacienda Ñomala, Chauro and Serrán, *Weberbauer 5959,* type; *5984; 5997.* La Brea, *Horton 11574; 11578* (both det. Johnston). Pariñas Valley, *Haught 136; 156.*—Ayacucho: Huanta, *Killip & Smith 23343* (det. Killip).

21. ANODA Cav.

Reference: Hochreutiner, Ann. Cons. Jard. Bot. Genève 20: 29–68. 1916.

Low growing somewhat hispid or glabrate herbs with entire to serrate often hastately 3-lobed or rarely dissected leaves and pedunculate yellow or purple flowers axillary (Peru) or in terminal racemes. Petals spreading, exceeding the rather stout stamen-tube; style branches abruptly capitate- or discoid-stigmatose. Carpels opening laterally by an evanescent septum, spurred dorsally, the thin endocarp falling with the seed, or merely angled or with a dorsal

umbo, the endocarp thin, reticulate, becoming sac-like or sometimes joined with seed; yet again not separating from the pericarp.—Probably there is only one variable entity in Peru since *A. extrema* Hochr., l.c. 64, judging from its relationship, is more likely from Mexico as is often the case for specimens labelled simply "Pavón."

Anoda cristata (L.) Schlecht. Linnaea 11: 210. 1837; 44. *Sida cristata* L. Sp. Pl. 685. 1753. *A. hastata* Cav. Diss. 1: 38. 1785.

Simple or little branched, early erect, soon decumbent-ascending, a dm. to several dm. high, more or less hispid-setose especially above including the deeply parted calyces; leaves variable but commonly triangular-hastate, sometimes with obscure lateral lobes, often rather coarsely serrate, usually 4–5 cm. long, 3–4 cm. wide, truncate or sometimes cordate at base, acute to acuminate; peduncles soon exceeding leaves; calyx lobes about 7 mm. long, acuminate; flowers infundibuliform, white, roseate or lavender, usually 1.5– nearly 2 cm. long; carpels 10–20, hispid and rather long-spurred dorsally, the thin endocarp separating from the pericarp to envelop the seed firmly.—For full synonymy and varieties of this vegetatively variable herb see Hochreutiner. Often along trails and in neglected gardens. Several of the following distributed as *A. hastata.*

Cajamarca: Socota, *Stork & Horton 10100.* Libertad: Trujillo, *Killip & Smith 21515.* Huánuco: Cani, *3446.* Huánuco, *2067; 3225.* —Lima: Cavanilles' herb., type, *A. hastata.*—Huancavelica: Mantaro Valley, *Weberbauer 7607.*—Apurímac: Abancay and Chincheros, *Goodspeed Exped. 10553; 10779.*—Cuzco: Valle de Santa Ana, *Herrera 979.* Prov. Anta, *Vargas 219.* San Miguel, *Cook & Gilbert 1031.* Chile to Arizona. "Ruppu" (Cook & Gilbert).

22. BASTARDIA HBK.

Glandular pubescent herbs or small shrubs with small, usually yellow flowers, mostly solitary in the axils, the petals as calyx lobes spreading in anthesis. Style branches same number as the uniseriate carpels, the stigmas apical. Ovules solitary, pendulous.—Fruit technically a capsule, the 5–8 muticous to aristate thin walled carpels remaining attached to the axis, not separating septicidally, opening loculicidally; may be called a schizocarp (B.P.G.H.).

Flowers 10–12 mm. long; carpels biaristate; seeds partly glabrous or puberulous.

Stamen tube setose; pedicels short or obsolete.....*B. limensis.*

Stamen tube glabrous (typically); pedicels 5–10 mm. long in flower ..... *B. bivalvis.*

Flowers about 6 mm. long; seeds described as pilose.

Petals glabrous; nectary 5-lobed; carpels biaristate. . *B. parvifolia.*

Petals ciliate at base; nectary 5-angled; carpels not aristate. *B. viscosa.*

Bastardia bivalvis (Cav.) HBK. Nov. Gen. & Sp. 5: 255. 1822. *Sida bivalvis* Cav. Diss. 1: 13, *pl. 11.* 1785.

Shrub often a meter or two high, the slender branches, petioles, peduncles and calyces more or less glandular-villous and finely tomentulose or the former indument mostly lacking except on the younger parts; petioles mostly 1.5–4 cm. long or the lower 8–15 cm. long; leaves cordate-ovate, acutely acuminate, fine to coarsely crenate-serrate, lightly to sometimes densely stellate-tomentose both sides or green and minutely stellulate in age, commonly 4–7 cm. long, 3–5 cm. wide, sometimes 12 cm. wide; pedicels 5–10 mm. long to twice as long or longer in fruit; calyces deeply parted, the ovate-lanceolate lobes awned or apiculate, about 5 mm. long; petals 10–12 mm. long, marginally ciliate at base; stamen column typically glabrous (or sometimes sparsely hirsute?); fruit 10–12 mm. wide, the carpels shortly villous, 5–6 mm. high, aristate, the solitary seeds glabrous or puberulent.—The var. *aristata* (Turcz.) Hochr., Ann. Cons. Jard. Bot. Genève 20: 144. 1917, is merely tomentulose except the pedicels and calyces or younger parts, and I suggest the *B. limensis* is a synonym (B.P.G.H.).

Piura: Cabo Blanco, *Haught 257.* Amotape Hills, *Haught 172.* —Lima: Matucana, *385.*—Huánuco: Pozuzo, *4623* (var. *aristata,* det. Hochreutiner).—Arequipa: Chala, *Worth & Morrison 15607* (det. Johnston).—Loreto: Salinas de Pilluana, Huallaga, (*Ule 6704,* stamen tube with 4 or 5 trichomes, intermediate to *B. limensis,* fide Hochreutiner). To southern North America.

Bastardia limensis R. E. Fr. Sv. Vet. Akad. Handl. ser. 3. 24, no. 2: 23, *pl. 2.* 1947.

Much branched shrub, the slender younger branchlets early glutinose-tomentose, some hirsute trichomes more persisting; petioles mostly shorter than 1 (1.5) cm.; leaves membranous, at first whitish tomentose, finally green and sparsely stellate puberulent both sides, triangular-ovate, very openly cordate at base, rather long-acuminate, obtusely crenate, to 4.5 cm. long, 2.3 cm. wide, usually smaller,

densely reticulate veined; flowers subsessile or shortly pedicelled, most numerous at the tip of the branchlets; calyx 3–8 mm. long, the oblong acute lobes apiculate, tomentose; corolla yellowish, about 2 cm. wide (in herb.), the petals glabrous except densely ciliate at base; stamen tube 3 mm. long, setose; carpels 5, tomentulose and glandular hirsute, 4 mm. long, the slender rigid beaks about 1 mm. long; seeds glabrous or hirsutulous, subglobose, 2.5 mm. long.—So glutinous that the paper on which the specimens lay is colored yellow (Fries). Nevertheless I doubt if the plant is more than a variant of *B. bivalvis* (see note under that species). *B. spinifex* Tr. & Pl., recently found as near as Ecuador (cf. Fries, l.c. 23, for description), has spreading indument, narrowly cordate leaves to 7 cm. long, secund flowers, pilose calyx and carpels, these with beaks 3 mm. long.

Lima: San Bartolomé, 1,500 meters, (*Asplund 11202*, type); *11207*. Ambar, shelter of boulders, *Stork 11460* (det. Johnston, *B. bivalvis*).

Bastardia parvifolia HBK. Nov. Gen. & Sp. 5: 255. *pl. 472*. 1822. *B. viscosa* (L.) HBK. var. *parvifolia* (HBK.) Griseb. Fl. Brit. W. Ind. 80. 1864.

Similar to *B. bivalvis* but leaves often merely acute or if more or less acuminate not abruptly, petals entirely glabrous, about 6 mm. long, the seed pilose except the funicle; the nectary is 5-lobed.—After Hochreutiner, l.c. 143. Fries, Sv. Vet. Akad. Handl. ser. 3. 24, no. 4: 19–23. 1947, follows Grisebach's disposition which may indicate best the taxonomic value but account of the awned carpels it seems allied to *B. bivalvis*, its character largely defined by its smaller (1–2 cm. long) canescent-tomentose leaves, pedicels 7–15 mm. long. However, the type is Peruvian; Fries questions the identity of Cuban specimens, so it is expedient to leave it within Peru at present as distinct.

Cuzco: Pachachaca, Abancay, 2,200 meters, *Vargas 482* (det. Standley, *B. bivalvis*).—Cajamarca: Pongo de Rentama to Tomependa, Jaén de Bracamores, (*Bonpland*, type).

Bastardia viscosa (L.) HBK. Nov. Gen. & Sp. 5: 256. 1822. *Sida viscosa* L. Syst. Nat. ed. 10. 1145. 1759.

Velvety pubescent and viscid (except in one variant) half-shrubs sometimes a meter high, often also with many simple trichomes; leaves cordate-ovate, acuminate, rather repandly dentate, varying

in size, often 2–5 cm. long, sometimes much larger; pedicels usually 1.5–3 (4) cm. long; calyx 3.5–5 mm. long, tomentose, the lobes acuminate, shorter than the mature 5–8-celled fruit, this 5–7 mm. wide, the 3 mm. long carpels muticous; seeds white-pilosulous, 1.7 mm. long.—Occurs in Peru according to Britton & Millspaugh, and certainly as near as Guayaquil; also in Argentina (Fries).

Peru (probably). To Mexico and the West Indies.

23. TETRASIDA Ulbr.

Becoming a small tree, the leaves entire, the flowers many, yellow, fascicled in terminal panicles. Involucre wanting. Calyx cupulate, with 4 broad unequal lobes. Carpels 5, the solitary ovule pendulous. Fruit depressed, breaking the persisting patelliform calyx, the 1-seeded carpels parting from central axis but cohering at base, longitudinally dehiscent laterally (Ulbrich, Notizbl. Bot. Gart. Berlin 11. 533. 1932).—Absence of involucel and character of ovule suggest *Sida* (Ulbrich) but the calyx and almost completely loculicidal carpels make this a very distinct genus (Kearney).

I have seen only a specimen labelled *Tetrasida polyantha, Williams 6663*, rather poor, without flowers, but with several good fruits. All of them have at least 8 carpels (loculicidal and septicidal). In Notizbl. Bot. Gart. Berlin 11: 533. 1932 the author states that there are 10 carpels. If the number of 5 styles given by the author is right it means a most extraordinary fact (we know in the Ureneae that there are 10 styles for carpels), but if it is true we would have here 5 styles for 10 carpels. Description of *S. tulla* being incomplete it is impossible to tell the truth (B.P.G.H.).

Tetrasida polyantha Ulbr. Bot. Jahrb. 54: Beibl. 117: 66. 1916. *Sida tulla* Ulbr. Notizbl. Bot. Gart. Berlin 11: 534. 1932?

Branches, leaves, calyces and petioles, these to 3 cm. long, glabrate in age; stipules promptly caducous, linear, 4 mm. long; leaves ovate or oblong-ovate, cordate, acuminate, to 12 cm. long, 5.5–6 cm. wide, early more or less tomentose, entire, prominently 7-nerved and reticulate beneath; pedicels 1–1.5 cm. long; calyx 4 mm. long, the broadly ovate obtuse to subacuminate lobes unequal; corolla sub-spreading, nearly 1 cm. long, connate 1 mm. with glabrous stamen tube, the obovate petals only ciliate at base, emarginate; fruits 6–7 mm. across, 4 mm. high; carpels subligneous, obliquely oblong, 2.5–3 mm. broad, more or less appressed stellate

pubescent as the triangular ovoid seeds.—Tree to 8 meters high (Raimondi). I am indebted to Dr. Kearney for the probable disposition of *Sida tulla* but in Leafl. West. Bot. 7: 121. 1954 he has commented on it as follows: the leaves are broader, with a more open basal sinus, their stellate hairs are somewhat longer and the flowers are larger in all their parts; the globose flower buds, deeply reniform anthers and large capitate stigmas are especially noteworthy; until fruit is available the relationship remains uncertain.

Cajamarca: Jaén to Bellavista, 600 meters, *Weberbauer 6208*, type. Toward Cutervo, 1,400 meters, *Raimondi*.—Amazonas: Jaguanga to Bagua, *Raimondi*.—San Martín: Tarapoto, *Williams 6663*. Cuzco: Santa Ana, Rio Urubamba, (*Cook & Gilbert 1505*, type, *S. tulla*).

BOMBACACEAE. Balsa Family

Trees or shrubs characteristically with notably enlarged trunk with alternate now digitate now simple leaves and often large flowers solitary or few in the leaf axils. Indument stellate or lepidote. Calyx coriaceous, generally closed in bud and at anthesis, usually irregularly lobed or truncate. Petals 5, asymmetrical, contorted in bud, distinct but commonly connate at base with the staminal tube, this 5-branched. Stamens 5–many, connate into 1–several bundles, the anthers 1–2 (or more) -celled. Ovary 2–5-celled, each cell with 2–many ovules ordinarily imbedded in soft or lanate tissue. Fruit ligneous, usually splitting loculicidally into 5 valves, the smooth seeds rarely arillate.

Kapok, which has become the common (market) name for the wooly fibers that fill the mature fruits of a number of species, principally those of *Ceiba pentandra*, pantropic but cultivated, mostly in Java, and Balsa (*Ochroma*), one of the lightest woods (or the lightest in markets), are the useful and most outstanding products, well-known, too, because their exceptional characteristics caught the public fancy; for an entertaining and informative account of these trees see Standley and Steyermark, Fl. Guatemala (Fieldiana: Bot. 24, pt. 6: 387–402. 1949, after the various genera); also Record, Trop. Woods 59: 1–20. 1939, and Williams, Field Mus. Bot. 15: 309–317. 1936, the two last for technical and economic information.

Besides the following, the highly interesting *Patinoa* Cuatr., Rev. Inst. Bot. App. Agric. Trop. 369–370: 306–313. 1953, could occur

in Amazonian Peru. Two species are known: *P. almirajo* Cuatr., l.c. 309, the pulp of the chocolate shaped fruits agreeable, and *P. sphaerocarpa* Cuatr., l.c. 312; the former is cultivated as *"Almirajo"* in Brazil. The genus resembles *Matisia*, a part of *Quararibea*, as to staminal structure but is characterized by its entire leaves, tubular calyx, 5-celled ovary and large baccate fruit with coriaceous epicarp and large lanate seeds; the genus is named for the collector, Victor Manuel Patiño, distinguished agronomist.

Leaves digitately divided.

Stamens numerous, the long filaments from a much-divided tube; trees usually aculeate.....1. *Bombax.*

Stamens (fertile) few or the tube 5–10-parted with few apical anthers.

Stamens 5, with partly free filaments, the tube 5-parted. 2. *Ceiba.*

Stamens with quite sessile anthers, tubes obsoletely 5-dentate. 3. *Chorisia.*

Leaves simple, rarely unifoliate and articulate, somtimes lobed.

Flowers as fruits 1 dm. long or longer, the latter filled with silky fibers.....4. *Ochroma.*

Flowers as fruits much smaller.

Leaves pseudo-simple, articulate; stamen tube cleft. 5. *Huberodendron.*

Leaves not articulate; stamen tube 5-dentate or divided or obsolete.

Stamens united into 5 fascicles; fruit samaroid. 7. *Cavanillesia.*

Stamens united into a single tube; fruits not samaroid.

Drupes (or similar fruits) with 1–5 seeds; anthers short; flowers solitary or fascicled.....8. *Quararibea.*

Capsules with many winged seeds; anthers vermiform, septate; flowers subumbellate.....6. *Septotheca.*

1. BOMBAX L.

Pachira Aublet, Pl. Guian. 2: 725. 1775.

Trees, often large, the digitate leaves with 2–9 subentire or repand, sometimes crenate-serrulate leaflets, the usually white or yellowish flowers rather short to long and slender, solitary on single or

fascicled axillary or terminal peduncles or rarely paniculate. Calyx firm or coriaceous, truncate, obsoletely or irregularly dentate or lobed, always much exceeded by the conspicuously pubescent and narrow petals. Stamens many, connate toward or at base. Ovary early 5-celled. Capsules at maturity lanate within or less often the dissepiments fleshy, the many seeds usually surrounded by the wool-or cotton-like fiber that is derived from the endocarp. —*Pachira*, which, at least practically, ought to be included, but with apparently the basic character, fruits not lanate-filled, the seeds larger, has been shown by Ducke, Arch. Jard. Bot. Rio Jan. 5: 160–161. 1930, to be in fact properly as well as expediently a part of *Bombax*, since *B. obtusum* without wool-filled fruits has the typically small seeds of *Bombax*, *B. paraense* lanate-producing fruits but large seeds of *Pachira*, and calls to attention the presence of seeds equipped for water or wind dispersal within the same genus in several other families as Vochysiaceae, Leguminosae and Ochnaceae. Anyway, the classification is more useful, being sensible, and equally scientific, or erudite shall we say, with a species of *Bombax* which is always that in flower and is still a *Bombax* even when in fruit.

Besides the following, *Weberbauer 4250* from near Celendín, Cajamarca, may be a new species comparable, at least in Peru, to *B. balanoides* Ulbr. but with petiolulate leaflets; flowers about 8 cm. long; it was given a name by Weberbauer (seemingly never published) after the locality (F.M. Neg. 9530).

Leaflets not articulate with the apical petiole disk; petals 5–12 cm. long; trees unarmed.

Flowers more or less precocious, to 6.5 cm. long; leaflets glabrous. *B. munguba.*

Flowers borne with the somewhat pubescent leaves and to 12 cm. long. . . . . *B. marginatum.*

Leaflets articulate; trees usually somewhat aculeate.

Flowers few, showy, 4–many cm. long.

Leaflets retuse or rarely rounded apically; flowers 12–many cm. long.

Calyx glabrous; petals 12–15 cm. long. . . . . *B. paraense.*

Calyx tomentose; petals 3 dm. long or longer. *B. Spruceanum.*

Leaflets usually acute or flowers smaller.

Flowers 2–4 dm. long; leaflets oblong-lanceolate. *B. aquaticum.*

Flowers 5–8 cm. long; leaflets oblong-obovate . . *B. balanoides.*

Flowers at most 2 cm. long, paniculate.

Leaflets obovate, abruptly apiculate . . . . . *B. Ruizii, B. discolor.*

Leaflets oblong-lanceolate, acuminate.

Leaves as calyces puberulent . . . . . *B. Weberbaueri.*

Leaves as calyces glabrous . . . . . *B. Vargasii.*

Bombax aquaticum (Aublet) Schum. in Mart. Fl. Bras. 12, pt. 3: 233. 1886 (as *Pachira aquatica*) or Pflanzenfam. 3, Abt. 6: 62. 1890. *Pachira aquatica* Aublet, Pl. Guian. 2: 726. *pls. 291, 292.* 1775.

Tree, glabrous except the flowers, flowering as a shrub but becoming 20 meters tall or taller, the narrow high-buttressed trunk with smooth pale bark; petioles to 2 dm. long or about as long as the narrowly oblong or oblong-lanceolate obscurely acute or shortly acuminate leaflets, these 5–7, firm-membranous or subcoriaceous, yellowish-green; flowers solitary, the truncate ferrugineous calyx 1.5 cm. long, the stellate-pubescent petals 2–3 dm. long; style with shortly 5-lobed stigma; stamens connate into 15 repeatedly parted fascicles; fruit to about 2.5 dm. long, ferrugineous, tomentulose without, the angular seeds 4 cm. long.—Petals reddish-brown and greenish, stamens white (Ducke); white or greenish-yellow, the filaments purple or reddish (various authors). Illustrated, Mart. Fl. Bras. 12, pt. 3: *pl. 46, fig. 2.*

San Martín: Juanjuí, *Klug 4157* (det. Standley).—Loreto: Yurimaguas, *Killip & Smith 28121; Williams 3937* (both det. Ulbrich). Caballo-Cocha, *Williams 2431* (det. Ulbrich). "Bellaco caspi," "wimba" (Williams). To the Guianas.

Bombax balanoides Ulbrich, Notizbl. Bot. Gart. Berlin 6: 156. 1914.

Smooth and glabrous (except the petals), the brown barked branches of the small crown terete; stipules promptly caducous, ovate, 6 or 7 mm. long, 4–5 mm. wide; petioles to 12 cm. long, subterete, with apical disk 8–12 mm. across; leaflets sessile, 5–7, obovate or oblong-obovate, subobtusely acuminate to rounded-obtuse, entire, 14–18 cm. long, 5–9 cm. wide, subcoriaceous, nearly concolorous but somewhat lighter beneath, the 9–12 moderately

remote lateral nerves equally obvious both sides; flowers solitary or few in the upper axils on stout peduncles 2.5–4 cm. long, these squamulose and with 3 rudimentary bractlets; calyx cupulate, ligneous, truncate, glabrous also within; petals ovate-lanceolate, subobtuse, about 4 cm. long, 1.5–2 cm. wide, coriaceous, white (drying brown-olive), reflexed, finely tomentulose without, sericeous tomentose within; stamen tube nearly 1 cm. long and about 8 mm. thick, brownish tomentose except the 10 (more or less) apical phalanges of many glabrous filaments, these about 3 cm. long; ovary squamulose, style 5–7 cm. long; fruit (immature) 4 cm. long, 1 cm. thick, glabrous toward apex.—Flower buds simulate those of oak (*Quercus*); allied to *B. septenatum* Jacq. (*B. cumanense* HBK.) of Venezuela, but petioles and filaments longer, leaves, stamen tube and style shorter (Ulbrich). Type with columnar trunk 6–12 meters high. F.M. Neg. 9527.

Río Acre: Seringal Auristella, *Ule 9596*.

Bombax discolor HBK. Nov. Gen. & Sp. 5: 299. 1822.

Unarmed, the terete younger branchlets puberulent; petioles 6 cm. long or longer, finely canescent tomentose; leaflets 5, sessile, oblong, cuneate at base, acuminate, the larger about 1 dm. long, 3 cm. wide, crenulate, reticulate veined, membranous, green but hirsute above, softly stellate-tomentose beneath; flowers paniculate, pedicels 3–4 mm. long; calyx urceolate, truncate, obsoletely denticulate, canescent tomentulose; petals 5, sericeous tomentose without, pubescent within, barbate-tomentose toward obtuse apex; stamens 60–70, longer than corolla, filaments connate below; ovary hirsute, 5-celled; stigma simple.—Backhuizen referred this, with query, to the Brazilian *B. pubescens* Mart. Nov. Gen. & Sp. 1: 91. *pl. 58*, a possibility I have not been able to study; however, ex char. that species has retuse leaflets. F.M. Neg. 35357.

Cajamarca: San Felipe, Prov. Jaén de Bracamoros, *Bonpland*, type. Chala, *Martinet*. Cascas, *Raimondi*.

Bombax marginatum (St. Hil.) Schum. in Mart. Fl. Bras. 12, pt. 3: 223. 1886. *Pachira marginata* St. Hil. Fl. Bras. Merid. 1: 260. *pl. 51*. 1827.

Branchlets, petioles (1.5–2.5 dm. long) and solitary angled peduncles (3–6.5 cm. long) glabrous but the 7–9 foliolate leaves conspicuously ferrugineous tomentose or glabrate above in age; leaflets sessile and inarticulate on the dilated petiole apex, lanceolate-

oblong or obovate-oblong, entire, 6–17 cm. long, about 3–8 cm. wide, attenuate to base, obtuse or obtusely acuminate; calyx cupulate, entire, glabrous or tomentulose, 12–18 mm. long, somewhat wider; petals acute, greenish tomentose or toward base villous and whitish villous within, 8–12 cm. long, about 1 cm. wide; stamen tube about as long as calyx, villous at base, finally glabrous; pistil exceeding filaments; ovary glabrous, stigma obsoletely 5-lobed; capsules 7.5–9 cm. long, 3–3.5 cm. thick, ovoid, glabrous as the ovate seeds, these 3–3.5 mm. long.—The leaves of the Peruvian collection are notably reticulate-veined beneath. Illustrated, Mart. Fl. Bras. l.c. *pl. 44*.

Junín: Chanchamayo Valley, *Schunke 1557* (det. Ulbrich). Brazil.

Bombax munguba Mart. Nov. Gen. & Sp. 1: 93. *pl. 99*. 1826.

Stout branches subverticillate; petioles 2 or more cm. long, dilated at apex; leaves terminally crowded, with 7–8 inarticulate oblong-lanceolate leaflets, these attenuate at base, the petiolules to 2 cm. long, acute or acuminate, subcoriaceous, about 1.5–3 dm. long, 5–11 cm. wide; peduncles 6.5–9 cm. long; calyx 1 cm. long, tuberculate, entire; petals 5–6.5 cm. long, tomentulose, finely white puberulent within as the 1 cm. long stamen tube, this apically parted into 10 phalanges of many filaments, the anthers straight; ovary as style at base glabrous.—Sometimes 50 meters tall, the inner bark used for cordage (Williams).

Huánuco: Tocache, *Poeppig*.—Loreto: Río Nanay, *Williams 260; 610* (det. Ulbrich). Caballo-Cocha, *Williams 2506*. La Victoria, *Williams 2866* (det. Standley). Amazonian Brazil. "Huina caspi," "punga blanca" (Williams), "monguba" (Brazil).

Bombax paraense Ducke, Archiv. Jard. Bot. Rio. Jan. 4: 124. 1925.

Nearly glabrous tree (except the leaves beneath and flowers), the branchlets obscurely or not verruculose; petioles to 1 dm. long, strongly dilated apically; leaflets 5–7, articulate, oblong-obovate, broadly retuse or rarely rounded at tip, cuneately attenuate to very short petiolule, sometimes 18 cm. long, 7 cm. wide, papyraceous (not in Peru), lustrous above, minutely lepidote and opaque beneath, the fine nerves and veins prominent both sides; peduncles often 1.5–2.5 dm. long, rather stout, striate; calyx at anthesis 1.5–2 cm. long, finely rugose, glabrous without except often tomentulose at

apex, sericeous within, eglandular at base, truncate; petals 12–15 cm. long, 6–9 mm. wide, brunnescent stellate-tomentulose without, rubescent and finely tomentulose within; stamen tube 3–5 cm. long, a little tomentulose below the apex, the purple stamens greenish white at tip.—Ducke, l.c. 5: 161. 1930, described the fruit as ovoid, 1.5 dm. long, about 9 cm. thick (dried), thinly ferrugineous tomentose, filled with brown wool, the oblong-elliptic seeds not angled, 2.5 cm. long, 1.5 cm. wide, and remarked: this species is exactly between typical *Bombax* and the section *Pachira* in several of its characters: the wool filling the mature fruit is quite that of the first but the seeds have the appearance of those of the last. Surely doubtful is the determination for the Peruvian specimen, said to have large white flowers, the heavy coriaceous (2–3) leaflets to 1.5 dm. long, 6 cm. wide, immature obovoid fruit 6 cm. high, 5 cm. across depressed top, brown-lanate within; common in dense forests according to the collector, who gives wood description, Field Mus. Bot. 15: 312. 1936. F.M. Neg. 9540.

Loreto: Manfinfa, Upper Río Nanay, *Williams 1097* (det. Ulbrich, with query). Amazonian Brazil. "Punga blanca de chamisal."

Bombax Ruizii Schum. Bot. Jahrb. 25: Beibl. 60: 17. 1898. *Millea ecuadorensis* Standley, Field Mus. Bot. 17: 199. 1937, fide Cuatrecasas.

Stout branches quite glabrous; petioles early puberulent, 11–18 cm. long; leaves herbaceous, the elliptic or obovate leaflets shortly and acutely acuminate, 7–15 cm. long, at or above the middle 3.5–7.5 cm. wide, serrulate, minutely and sparsely pubescent on the castaneous upper surface, softly and rather canescently pubescent beneath and the often more than 20 lateral nerves conspicuous; panicle many flowered, in the type 12 cm. long, nearly as broad, the branches divaricate; pedicels scarcely 5 mm. long; calyx 2 mm., petals 13–14 mm., androecium 11 mm. long.—No known species has flowers so small, inflorescence so composite (Schumann). The roots bear many tubers, some attaining 1.5 × 1 dm. (Haught). Svenson, Amer. Journ. Bot. 33: 415. 1946, suggested this might be the same as *B. discolor* while Bakhuizen considered it a possible synonym of *B. globosa* Aublet of the Amazon, which, from range alone, seems less likely. The type by Tafalla from Guayaquil. F.M. Neg. 9543.

Piura: Cerro Viento, *Haught 105* (det. Cuatrecasas; det. Weberbauer, *B. discolor*). "Pisaiya" (Haught), "quinihuc" (Tafalla). Southern Ecuador.

Bombax Spruceanum (Dcsne.) Ducke, Archiv. Jard. Bot. Rio Jan. 4: 126. 1925. *Pachira Spruceana* Dcsne. Fl. Serres 23: 46. 1880; Misc. Bot. 7. 1880. *P. insignis* of Schumann not (Sw.) Sav. which is *B. spectabilis* Ulbrich, fide Ducke, l.c.

Glabrous tree, except the flowers, the branches stout; petioles elongate, much enlarged at base; leaves coriaceous, lustrous above, the leaflets usually 7 (rarely 8 or 9), oblong-obovate, always rounded or retuse; peduncles short, stout; flowers 3–4 dm. long; calyx cupulate, 2.5 cm. long and broad, tomentulose without as the petals, especially within, these as stamens deep purple but terminally white, petals without brownish-red, calyx velvety brown (Ducke). —The fruit is said to be depressed as in the species with which it has been confused. Magnificent tree, sometimes 20 meters tall; leaflets usually 7 (–9); petals 3–4 dm. long, purple within as stamens, reddish brown without; fruit ovoid, apparently longer than that of *B. aquatica* (Ducke). F.M. Neg. 9544 (fide Ducke); 35353.

Loreto: Clearing, Mishuyacu near Iquitos, *Klug 1479* (det. Ulbrich). Río Acre and Amazonian Brazil. "Mamorana grande."

Bombax Vargasii Cuatr. Phytologia 4: 468. 1954.

Small essentially glabrous tree, the nodes of the terminal branchlets little enlarged, the few 5-foliolate leaves borne at their tips on slender rigid petiolules 5–6.5 cm. long, these enlarged at base and ampliated into a short pentagonous disk at apex; leaflets articulate, lanceolate, attenuate to the sessile subobtuse base, acutely long-acuminate, serrulate, 6–11 cm. long, 18–28 mm. wide, subherbaceous, pale green, sparsely and minutely granulose squamulate both sides, sublustrous and obscurely venose above, prominently so beneath, the secondary filiform nerves 1.5–2 mm. distant; flowers as many as 10 in short cymes at tip of exfoliate branchlets; pedicels 3–5 mm. long, often minutely 3-bracteolate; calyx cupulate, obsoletely 5-denticulate, 3 mm. long, long-barbate within at base; petals linear-oblong, about 27 mm. long, 3.5–4 mm. wide, whitish pubescent within, about one fourth connivent below, reflexing above; stamen tube glabrous, 6 or 7 mm. long, filaments about 90, shorter than petals; ovary sericeous, style glabrous, filiform, about 16 mm. long, the stigma smooth.—Allied to *B. discolor* HBK. and to *B. Ruizii* Schum., both with pubescent narrower leaflets, those of the former larger, the inflorescence of the latter pubescent, the flowers smaller. A specimen by Gay, from Cuzco, referred with query by Schumann to *B. discolor* probably belongs here or to *B. Weberbaueri.*

Cuzco: Sisal, Prov. Anta, 2,100 meters, *Vargas 1087*, type.

Bombax Weberbaueri Cuatr. Phytologia 4: 469. 1954.

Stout branchlets scarred by the enlarged nodes and petiole bases; petioles about 5 cm. long, enlarged at base, the apical amplification small; leaflets 5, obovate-oblong, cuneately narrowed to base, obtuse and shortly mucronate, serrulate above the middle, 4–6.5 cm. long, to about 2.5 cm. wide, densely puberulent both sides, the trichomes above simple or fasciculate, those beneath stellate, the secondary nerves 2.5–3 mm. distant; terminal panicles leafless, 2–7 cm. long, stellate-pubescent; pedicels to 4 mm. long; calyx cupulate, 3 mm. high, truncate, tomentose without, sericeous within; petals linear-oblong, 20–22 mm. long, 3.5–4 mm. wide, villous-hirsute without, pubescent and dull salmon color (in herb.) within; stamen tube 6 mm. long, glabrous, ventricose above the base, the 40–60 filaments little shorter than the petals; ovary hirsute toward the apex, the filiform style more or less 3–5-parted; capsules ovoid, lustrous brown, 3.5 cm. high, 2.5 cm. in diameter (medial); seeds oval, glabrous, nearly black, 6 mm. long, about 5 mm. thick.—Allied to *B. Ruizii* and *B. discolor*, both with much larger leaflets, different pubescence. To 10 meters high, large, spreading tree, the bark brown, smooth; flowers pale yellow, wool brown.

Apurímac: At 2,500 meters, *Weberbauer 5849*, type. At 1,800 meters, *Herrera 1968*. Pacachacos Valley, *West 3792*.—Cuzco: Puente Cutuctay, valley of Apurímac, (*Buës 1967*). "Pati."

2. CEIBA Gaertner

Eriodendron DC. Prodr. 1: 479. 1824. *Spirotheca* Ulbrich, Notizbl. Bot. Gart. Berlin 6: 159. 1914, fide Bakhuizen.

Like *Bombax*—capsules lanate within—but the stamens 5 connate into a tube.—The calyx may be truncate and the spiralled anthers sometimes much elongate, in one species 4-celled. In my original preparation of this account I argued for the maintenance of Ulbrich's genus but actually it seems preferably classified as a new section, since elsewhere in the family the calyx may be either truncate or lobed in the same group and the anther character, while extreme (apart from the number of cells, also variable in the family) is alone scarcely a generic indication. The branches of young trees may be somewhat aculeate, as the trunk.

Petals 3–6 cm. long.

Flowers 1–5, calyx to 18 mm. long; ovary glabrous. . *C. pentandra.*

Flowers 1–2, calyx 3–4 mm. long; ovary sericeous. *C. trichistandra.*

Petals 8–12 cm. long.

Anthers elongate, more or less coiled at least in age; leaves entire.

Petals salmon-rose, merely puberulent; calyx cupulate. *C. salmonea.*

Petals sericeous lanuginose.

Calyx much shorter than the stamen tube... *C. trichistandra.*

Calyx and stamen tube subequal..... *C. samauma.*

Anthers short, to 7 mm. long, scarcely coiled; leaves sharply serrate..... *C. pubiflora.*

Ceiba pentandra (L.) Gaertn. Fruct. 2: 244, *pl. 133.* 1791. *Bombax pentandrum* L. Sp. Pl. 511. 1753.

Becoming a beautiful tree, the columnar trunk flanked in age toward base with thick broad buttresses, the cupola-shaped crown with very thick branches (these spiny only in young trees); petioles elongate or about as long as the 5–7 lanceolate acuminate often finely serrate leaflets; flowers precocious, fasciculate on the stems; calyx about 15 mm. long, campanulate, irregularly 4–6-lobed, the petals two or three times longer, densely white velvety tomentose especially without; stamen tube short, the 5 filaments with spirally twisted anthers; fruits (1) 2–3 dm. long, the many lanate imbedded seeds about 5 mm. long.—The silky hairs that originate from the inner wall of the fruit are cylindrical, full of air, impermeable to moisture and therefore extremely buoyant. Trees sometimes 65 meters high.

Kapok of commerce is the floss of the pods widely used for buoys, etc. but probably being replaced by plastics and treated rubber.

Huánuco: Tingo María, *Burgos 44* (det. Standley).—Puno: Sandía, *Weberbauer 1348.*—Río Acre: Mouth Río Macauhán, *Krukoff 5648.* Tropics of both hemispheres. "Ceiba," "huimba" (Burgos).

Ceiba pubiflora (St. Hil.) Schum. in Mart. Fl. Bras. 12, pt. 3: 213. 1886. *Eriodendron pubiflorum* St. Hil. Fl. Bras. Merid. 1: 266. 1827. *C. Mandoni* Britten & Bak. f. Journ. Bot. 34: 175. 1896, fide Bakhuizen.

Branchlets smooth; petioles 1–1.5 dm. long; leaflets 6–7 (petiolules to 12 mm. long), ovate or ovate-lanceolate, acuminate, about 5–10 cm. long, 2.5– about 4 cm. wide at or a little above the middle,

coarsely serrate, membranous; peduncles to 12 mm. long; calyx campanulate, glabrous without, about 2.5 mm. long, the lobes white tomentose within; petals 8 (more or less) cm. long, oblong-ovate, white sericeous especially without; stamen tube cylindrical, subequaling calyx, the stamens about as long as the petals.—The staminodial annulus is toward the apex of the joined portion of the filaments; description that of Britten and Baker f. The anthers are only 6–7 mm. long. The leaflets may be only 3 or 4, entire or lightly serrulate (*C. boliviana* Britten & Bak. f. l.c. 174, fide Bakh.); it is not entirely clear that the Andean tree with more or less coarsely serrate leaflets is not at least varietally distinct. F.M. Negs. 35366; 23784 (*C. Mandoni*).

Apurímac: At 2,400 meters, *Weberbauer 5874* (det. Ulbrich, *C. Mandoni*).—Cuzco: Sta. Rosa, Prov. Convención, *Vargas 7195* (det. Cuatrecasas, *C. Mandoni*). Bolivia; Brazil. "Pati" (Weberbauer).

Ceiba salmonea (Ulbrich) Bakh. Bull. Jard. Bot. Buitenz. ser. 3. 6: 198. 1924. *Spirotheca salmonea* Ulbrich, Notizbl. Bot. Gart. Berlin 6: 160. 1914.

Branches terete, glabrous but sparsely aculeate with tiny conoid prickles; leaves lacking in flowering type; peduncles solitary, minutely squamose, 5–8 mm. long; calyx campanulate-cupulate, truncate, 10–12 mm. high, 13–14 mm. across or in fruit to 20 mm., glabrous without, suberose-ligneous, yellowish sericeous within; petals linear, obtuse, 7–10 cm. long, 13–15 mm. wide, coriaceous, tomentose both sides, salmon or salmon-rose; stamen tube cylindric, puberulent tomentose, 1–1.5 cm. above the articulation glabrous as the 2–5 cm. long filaments, the linear anthers about 3 cm. long, 2.5–3 cm. wide, the 4 spiralled cells convolute in bud about the filaments and style; ovary cylindric, 12 mm. long, ferrugineous tomentose, style 5–8 cm. long, stigma 5-lobed.—A 3 meter shrub allied to *C. Rivieri* Dcne. (*S. Rivieri* Ulbrich) of eastern Brazil with much smaller flowers, conoid stamen tube and ovary (Ulbrich). F.M. Neg. 9547.

Puno: Sandía to Chunchusmayo, *Weberbauer 1116*, type.—Huánuco: Río Pozuzo, *Weberbauer 6770*.

Ceiba samauma (Mart.) Schum. in Mart. Fl. Bras. 12, pt. 3: 210. 1886. *Eriodendron samauma* Mart. Nov. Gen. & Sp. 1: 89. *pl. 98*. 1826.

Fine tree, 20–30 meters tall or taller, the bulging or somewhat barrel-shaped trunk aculeate, the slender flowering branchlets smooth, glabrous except for the strikingly pubescent flowers, the petals orange sericeous-villous without, within, as the calyx, finely puberulent; petioles 5–10 cm. long, to 2 mm. thick, apical disk 5 mm. across; leaflets shortly petiolulate (2.5–5 mm.), oblong or oblong-lanceolate, acute at base, obtusely acuminate, 6–15 cm. long, medially 2.5–6 cm. wide, drying purplish or reddish and lustrous above, chartaceous; peduncles 1–1.5 cm. long; calyx campanulate, to 4 cm. long, the lobes about 1 cm. long; petals oblong-spathulate, 10–11 cm. long, 3 cm. wide toward the obtuse tips, subequaled by the stamen tube, free filaments 6 mm. long, anthers orange; style glabrous toward tip, villous at 5-angled base; capsule oblong-ovoid, densely lanate within, the small seeds rusty tuberculate.—Martius noted the beauty and possible usefulness of the lustrous white wool of the fruits. F.M. Negs. 19670; 23783.

San Martín: Juanjuí, *Klug 4244* (det. Standley).—Loreto: Yurimaguas, *Poeppig 1234*. Mishuyacu, *Klug 949*. Mouth Río Santiago, *Tessmann 4653* (det. Ulbrich). Bolivia; Amazonian Brazil. "Samahuma" or "samauma" (Martius; Guarani name), "huimba" (Klug).

Ceiba trichistandra (Gray) Bakh. Bull. Jard. Bot. Buitenz. ser. 3. 6: 196. 1924. *Eriodendron trichistandrum* Gray, Bot. U. S. Expl. Exped. 1: 182. 1854.

Trunk ventricose about medially to 1.5 meters in diameter, the stout conical spines to 1.5 cm. long; branches densely aculeate, branchlets smooth, glabrous; petioles 1–1.5 dm. long; leaflets articulate, 5–9, oblong-subobovate, narrowed to base, abruptly caudate-acuminate, subentire, glaucous beneath, 0.5–1.5 dm. long; inflorescences from axils of defoliate branchlets, the flowers solitary or several; peduncles stout, somewhat hirsutulous, 2–2.5 cm. long, in fruit to 1 cm. thick; calyx fleshy, 3–4 cm. long, 2.5–3.5 cm. wide, irregularly 5–6-lobed, the rounded lobes reddish velutinous without, sericeous within; petals reflexing, obliquely obovate, glabrous within, sericeous-languinose without except apex and margins (in each case), 4–6 cm. long, 2.5–4 cm. wide, stamens about as long, tube conical, 3–5 times shorter than calyx, glabrous within and without, phalanges 3-parted below the middle, the anfractuose anthers versatile; stigma simple, globose; capsules pendulous, obovoid, glabrous without, 15–17 cm. long, 7–8 cm. in diameter, seeds to 1 cm. thick,

glabrous, sparsely scrobiculate.—After Bakhuizen, who illustrates the flowers and fruits, l.c. *pls. 30, 31.*

Peru: Type from a garden at Lima (*Wilkes Exped.*); also in Java, country of origin unknown.

3. CHORISIA HBK.

Aculeate, branched trees, the digitate leaves with 5–7 entire or serrate leaflets, the rather large rubescent flowers borne on axillary or subracemose peduncles that are 2–3-bracteolate before anthesis. Calyx cupulate, irregularly 2–5-lobed. Petals linear or oblong. Stamen column annulately 5–10-lobed below the middle, the teeth 2-antheriferous. Ovary 5-celled, the cells many ovuled; style obscurely 5-lobed. Capsules 3-valved.—Trunk developing as a beautiful smooth light-colored ventricose column. Named for L. I. Choris, who accompanied Kotzbue around the world.

Leaflets somewhat serrulate.....*C. insignis.*
Leaflets quite entire.....*C. integrifolia.*

Chorisia insignis HBK. Nov. Gen. & Sp. 5: 297. *pl. 485, fig. 1.* 1822.

Aculeate bottle-shaped tree, the branches slender; petioles 3–9 cm. long, only about 1 mm. thick, the apical disk 1–2 mm. across; leaflets 5–7 (petiolules 2–5 mm. long), obovate-oblong, abruptly and acutely short-acuminate, 5–12 cm. long, 3–4.5 cm. wide medially or a little above the middle, somewhat serrulate toward the apex, chartaceous, lustrous above, opaque beneath; peduncles to 2 cm. long; calyx glabrous, irregularly 2–4-lobed, 15–17 mm. long; petals oblong-obovate, obtuse, plane or more or less undulate-crisped above, roseate or crimson, canescent puberulent both sides, most densely without, 5–7 cm. long, about 1.5 (–2.5) cm. wide; stamen tube 4.5–5 cm. long, staminodia rufous puberulent; ovary glabrous, attenuate into the basally villous style, this somewhat enlarged under the stigma; capsules attenuate at base, oblong-ovoid, 10–14 cm. long.—Apparently variable in size of petals and degree of undulation. *C. crispiflora* HBK., without description, l.c. *pl. 485, fig. 2* (type, *Langsdorf*, Brazil), is scarcely to be included in *C. insignis* with smaller flowers; except for the strongly undulate petals it appears to be nearer *C. speciosa* St. Hil. to which species extra Peruvian material determined as *C. insignis* probably belongs.

Piura: Río Guiros, *Weberbauer 6349*.—Cajamarca: Tomependa and Chamaya, *Bonpland*, type.—San Martín: Juanjuí, *Klug 4304* (det. Standley, *C. crispiflora*). Near Tarapoto, *Spruce 3928* (det. Schumann).—Huánuco: Shapajilla, *Woytkowski 8*. Pampayacu, *Sawada 6*.—Cuzco: Hacienda Santa Rosa, *Soukup 513*.—Loreto: Yurimaguas, *Poeppig* (with ined. name).—Río Acre: Seringal Auristella, *Ule 9575* (det. Dahlem, *C. crispiflora*). "Lupuna," "guito algodón," "huimba" (Woytkowski).

Chorisia integrifolia Ulbr. Bot. Jahrb. 54: Beibl. 117: 77. 1916.

Completely glabrous except the flowers, the young terete dark colored branches rugulose, the broadly ovate bractlets slightly fimbriate; petioles 6–8 cm. long; leaflets obovate or oblong-oval, acuminate, 6–10 cm. long, (3) 5–6 (4) cm. wide, entire, the petiolules about 5 mm. long; peduncles to 2 cm. long; flowers white, about 7 cm. long, the thick calyx to 1.5 cm. long, 3–4-lobed, white sericeous within; petals firm, oblong-oblanceolate, 15–18 mm. wide, marginally entire, undulate, sericeous tomentose without and within toward the subacute tip, otherwise glabrous; stamen tube glabrous, 6 cm. long, curved, enlarged apically, staminodia fuscous villous, anthers 4–5 mm. long; ovary sessile, glabrous as filiform style, this exceeding stamens by 6 or 7 mm.—Much smaller flowered than *C. insignis* HBK. and *C. speciosa* St. Hil. both too, as *C. crispiflora* HBK., with more or less serrate leaflets, the latter however with similar flowers (Ulbrich); seems doubtfully distinct from *C. insignis* or the latter as interpreted less variable. F.M. Neg. 9551 (narrow leaved var.).

Cajamarca: Prov. Jaén, 900 meters, *Weberbauer 6195*, type. Junín: Chanchamayo, *Raimondi* (det. Ulbrich).

4. OCHROMA Sw.

References: Rowlee, Journ. Wash. Acad. Sci. 9: 157–167. 1919; John H. Pierce, Trop. Woods 69: 1–2. 1942; 70: 20–23. 1942.

Trees with ample simple palmately nerved and angulately lobed leaves, and large peduncled flowers terminal on the branchlets. Calyx lobes unequal, 2 acute, 3 obtuse. Stamen tube lobes short, covered from middle to apex with adnate 1-celled cohering spirally twisted anthers. Ovary 5-celled; stigmas exserted from the stamen tube, spiralled. Capsule subligneous, about cigar-shaped but elongate, the many seeds imbedded in an abundance of cottony fibers.—See Pierce, l.c. for synonymy and discussion. Record,

Trop. Woods 59: 15–18. 1939, gave a good summary of the commercial uses of this important timber tree, cultivations, technical description of the wood (after Williams) and pertinent bibliography, partly repeated by Standley and Steyermark in their entertaining account, Flora of Guatemala (Fieldiana: Bot. 24, pt. 6: 396–399. 1949). Williams, Field Mus. Bot. 15: 314–315. 1936, besides technical wood description quotes at length P. A. Means' description (Trans. Conn. Acad. Arts & Sci. 27. 1925) of the balsa rafts (carrying as many as fifty persons) constructed by the Incas (in use in 1530, on arrival of the Spanish). This author wrote, with the appreciation of a traveler from eastern North America, that the tree, very showy in flower, suggests *Liriodendron* (Tulip tree).

Ochroma Lagopus Swartz, Prodr. 98. 1788. *Bombax pyramidale* Cav. ex Lam. Encycl. 2: 552. 1788. *O. pyramidale* (Cav.) Urban, Repert. Sp. Nov. Beih. 5: 123. 1920. *O. peruviana* Johnst. Contr. Gray Herb. 81: 95. 1928. *O. boliviana* Rowlee, Journ. Wash. Acad. Sci. 9: 166. 1919.

Attaining only 20 or 30 meters but the often basally buttressed trunk a meter in diameter, the pale or reddish brown bark smooth, the crown small or depressed; petioles stout, shorter than the ample more or less angulately lobed and cordate broadly ovate or orbicular membranous leaves, these in Peru green and glabrous above, ferrugineous stellate beneath; flowers 1–1.5 dm. long, the fleshy white petals much longer than the rounded unequal lobes of the tubular-campanulate calyx.—Probably the Peruvian tree is var. *bicolor* (Rowlee) Standl. & Steyer., Field Mus. Bot. 23: 62. 1944, since the Peruvian form or race (*O. boliviana*) has leaves dark green above, tawny white beneath. Pierce, l.c. 69: 2, observed with reason, since priority is uncertain, Urban's combination based on uncertain data and *O. Lagopus*, so widely used it would seem wise to maintain it.

Wood important, especially for insulation, weighing 6–8 pounds per cubic foot, dry; not the lightest wood known but the only one with equal strength. Some botanists claim to recognize ten or more species, but for all practical purposes there is only one, *O. Lagopus* Swartz (*O. pyramidale* (Cav.) Urban), of which the others are varieties or forms (Record).

San Martín: Juanjuí, *Klug 4398*. Tarapoto, *Williams 5965*. —Amazonas: Chachapoyas, 1,600 meters, *Weberbauer 4310*.—Huánuco: Valley of Río Chinchao, 1,200 meters, *Stork & Horton 9882*. Pampayacu, *Kanehira 226*. Utcubamba, Marañón, *Weber-*

bauer, 191. Cuchero, *Poeppig.*—Junín: La Merced, *5250; Killip & Smith 24088; Isern 2069.* Puerto Yessup, *Killip & Smith 26395.*—Ayacucho: Río Pieni, *Weberbauer 5639.*—Cuzco: Potrero, *Vargas 8267.*—Loreto: Río Itaya, *Williams 166; 3439.* Iquitos, *Williams 3644; Klug 1466.* Yurimaguas, *Poeppig 2470; Killip & Smith 28170.* Puerto Limón, *Tessmann 3856* (det. Ulbrich).—Río Acre: Mouth Río Macauhán, *Krukoff 5308.* Bolivia to Mexico; West Indies. "Topa," "palo de balsa," "balsa," "huampo."

5. **HUBERODENDRON** Ducke

Tall high-buttressed unarmed trees with pseudo-simple 1-foliolate leaves (petioles rather distinctly articulate at apex) and small (for the family) slightly zygomorphic white flowers borne (in type species) in ample terminal panicles of racemiform cincinni. Calyx campanulate, valvate, irregularly 5 (3–4) -dentate. Petals 5, elongate-oblong, at anthesis somewhat revolute. Stamen tube unilaterally cleft below apex, above parted into 5 lobes, the more or less contorted anthers biseriate, 5 per lobe. Pistils shorter than stamens. Ovary sessile, 5-celled, with 5 (6) ovules in each series in each cell. Capsules fusiform or ellipsoid, 5-celled, pericarp ligneous, 5-valved, endocarp forming 5 papyraceous sacs enclosing the 2 longitudinally seriate seeds, these terminally long-alate.—A photograph of a typically buttressed tree and illustrations of the fruits (*H. Patinoi* Cuatr.) of this genus of magnificent trees has been given by Cuatrecasas in Fieldiana: Bot. 27, no. 1: 89–91. 1950. Filiform styles with 5-lobed stigmas usually exserted from cleft of stamen tube. Allied by the author to both *Septotheca* and *Bernoullia* Oliver, the former without stamen tube cleft, the latter with scarlet flowers, leaves of 5 or 6 leaflets, long-exserted style but with similar inflorescence which recalls that of *Raputia* (Rutaceae) while the flowers suggest those of *Styrax.* Meritoriously honors the active and able Swiss botanist, Jacques Huber. Perhaps the wood specimen (Yale 2187; George Barrel) from Amazonian Peru, with native name "Lupuna," apparently identical to that of *Bernoullia* (Record) belongs here, but the name is also recorded for *Chorisia.*

Huberodendron swietenioides (Gleason) Ducke, Archiv. Inst. Biol. Veg. Rio Jan. 2: 72. 1935. *H. styraciflorum* Ducke, l.c. 59. *Bernoullia swietenioides* Gleason, Phytologia 1: 109. 1934.

Branchlets robust as the alternate petioles, these to 7 cm. long; leaves subovate- or ovate-elliptic, obtuse or narrowly rounded at

base, obtuse or shortly acuminate, often 1–1.5 dm. long, 5–10 cm. wide, herbaceous-coriaceous, somewhat lustrous and equally finely reticulate veined both sides, with 7 or 8 lateral nerves; panicles laxly ferrugineous stellate-tomentose, the cincinni with 6–15 secund flowers; pedicels to 1 cm. long, stout, about equaled by the chartaceous calyx, this to 9 mm. wide at apex, appressed whitish-sericeous within; petals to 2 cm. long, 5–6 mm. wide, finely canescent sericeous both sides as the stamen tube below, this about 6 mm. long the obtuse lobes 5 mm. long, not extended beyond the anthers; ovary densely fulvous tomentose, the style glabrous; capsule fusiform, glabrous, narrowed to obtuse apex, 2 dm. long, 7 cm. in diameter, seeds about 14, dark chestnut, the suberose wing 6 cm. long, 1.5 cm. wide.—To 60 meters high or higher, not rare in inundated forests of the Purús and Acre rivers (Ducke), thus in adjacent Peru in all probability. The other known species, *H. ingens* Ducke, l.c., 60, has the long subulate stamen-tube lobes extended beyond the anthers, *H. Patinoi* Cuatr., l.c., 87, petals only 1.5 cm. long, fruit ellipsoid, 10–12 cm. thick, seeds larger, the wings 2.5–3.5 cm. wide.

Río Acre: Seringal Arisema, (*Ducke*). Mouth Río Macauhán, *Krukoff 5609*, type. Adjacent Brazil.

6. **SEPTOTHECA** Ulbrich

Stately trees with very large alternate coriaceous leaves, the younger parts lepidotely stellate. Flowers slightly irregular, subumbellate on elongate peduncles in the upper axils. Calyx tubular, the upper lobe obtuse, the 3 lower subacute, rigid-coriaceous. Petals 5, cuneate or spathulate. Stamen tube exserted shortly, 5-lobed at apex, the sessile anthers vermiform, obliquely septate. Ovary sessile, 5-celled, the many superposed ascending ovules anatropous; style branches 5, contorted or reflexed.—Differs mostly from *Quararibea* (*Matisia*) in the subumbellate inflorescence and vermiform anthers, according to Ulbrich, who gives a detailed description and analysis, Notizbl. Bot. Gart. Berlin 9: 128–135. 1924.

Fibers of twigs, petioles and peduncles are of remarkable strength (Ducke).

Septotheca Tessmannii Ulbr. Notizbl. Bot. Gart. Berlin 9: 129. 1924.

Younger branchlets and leaves both sides or the latter beneath densely squamate-stellate; stipules lanceolate, 4 cm. long; petioles 6 cm. long; leaves oblong-ovate, deeply cordate, subacute, 3 dm.

long, 1.5 dm. wide, (more or less), prominently nerved; peduncles about 1.5 dm. long, 3–5-flowered, the pedicels 2–2.5 cm. long; calyx about 4 cm. long, the lobes 4–5 mm. long, granulate with large stellate scales; petals greenish, thick-coriaceous, 3.5–4 cm. long, stellate without; stamen tube 5–5.5 cm. long, glabrous; anthers 3–4 mm. long, irregularly vermiform, longitudinally dehiscent; fruit a ligneous loculicidal oblong-cylindrical capsule 8–10 cm. long, about 4 cm. thick, obtusely beaked, with 5 shallow grooves, slightly rough, the many seeds extended into a thin subtruncate wing 2.5 cm. long, 8 mm. wide.—Type trunk at 2 meters 6 dm. in diameter; fruit from *Ducke 1657* from Tabatinga at boundary. Ducke, Bol. Técn. Inst. Agron. Norte, Belém 4: 21–22. 1945, has described in detail the fruit, observing that it splits into 5 triquetrous parts, long pendulous from peduncles, the inner portion and septum subpapyraceous; fruiting calyx funnelform, about 2.5 cm. long, 2 cm. wide. Illustrated, Schultes, Bot. Mus. Leafl. Harvard, 13: *pl. 29*.

Loreto: Yarina Cocha, *Tessmann 3214*, type. Colombia; adjacent Brazil. "Utucuru," "sapote rana" (Ducke).

7. CAVANILLESIA R. & P.

Pourretia Willd. Sp. Pl. 3: 844. 1800.

Large trees, the palmately nerved more or less lobed leaves appearing in the crown after anthesis of the roseate flowers, these disposed in umbelliform cymes. Calyx 5-parted. Petals 5, glandular at base within. Stamen column contracted above the base, finally separating into many pentadelphous filaments each with 1 reniform anther. Ovary 3–5-celled, the ovules geminate and erect from the cell base. Fruit indehiscent with 5 membranous wings much enlarged laterally, often with only 1 narrow seed.—Commemorates, of course, the talented contemporary of the authors.

Leaves palmately lobed, subpeltate, with odor of cumarin. *C. platanifolia.*

Leaves entire, cordate, faintly if at all with aroma.

Flowers red; trunk enlarged medially . . . . . *C. umbellata.*

Flowers ochraceous; trunk straight or little enlarged. *C. hylogeiton.*

Cavanillesia hylogeiton Ulbrich, Notizbl. Bot. Gart. Berlin 6: 163. 1914.

Trunk smooth, not or little enlarged, the slender branches forming an open crown; stipules ovate, 5–6 mm. long, 3–4 mm. wide, caducous; petioles 5–10 cm. long or longer, subtomentose; leaves oval, entire, truncate or cordate at base, obtuse or obtusely apiculate, to 2.5 dm. long, 2 dm. wide, glabrescent both sides but the pinnate nerves floccose-tomentulose, these very prominent beneath; flowers precocious, fasciculate at ends of branchlets and subumbellate on divided 2–4 cm. long peduncles, the pedicels 1 cm. long, tomentulose; calyx campanulate, 15–17 mm. long, 10–12 mm. broad, subtomentose without, sericeous within except lobes; petals 2.5–3 cm. long, 7–8 mm. wide, subspathulate, obtuse, ochraceous, glabrous within, sericeous without; stamen tube cylindric glabrous, 1.5 cm. long, filaments to 2 cm. long in fascicles or some solitary, anthers reniform, 1.5 mm. long; ovary tomentose, ovoid; style to 3 cm. long, glabrous above as truncate stigma; samara to 18 cm. high, nearly 20 cm. wide, the 5 oval wings about 9 cm. broad; seed oblong-fusiform, about 4 cm. long, 7–8 mm. broad.—Distinguished by the author from *C. arborea* (Willd.) Schum. "of Brazil and Peru" that is said to be a shorter tree with thicker rough-barked trunk, the branches more or less pendent, the leaves and blossoms much smaller, the latter red, and suggests that *C. arborea* may be the same as *C. umbellata*. To about 40 meters (Ule). F.M. Neg. 9548.

Río Acre: Seringal Auristella, *Ule 9594; 9595*, types. Mouth Río Macauhán, *Krukoff 5621*. Bolivia; Brazil. "Embirana," "pucca lupuna" (Ule).

Cavanillesia platanifolia (Humb. & Bonpl.) HBK. Nov. Gen. & Sp. 5: 306. 1823. *Pourettia platanifolia* Humb. & Bonpl. Pl. Aequin. 2: 162. *pl. 133*. 1817.

Tall beautiful tree, the trunk with smooth pale porous bark, the crown rather open, subglobose; petioles elongate; leaves sinuate-cordate at base, the 5–7 nerves and reticulate veins prominent beneath, somewhat stellate-puberulent both sides, 5–7-(authors) or often 3-lobed, or younger leaves cordate-oval, entire or 1–2-lobed; flowers precocious; calyx finely ferrugineous tomentose, campanulate, coriaceous, the ovate spreading lobes unequal; petals ligulate, oblong-obtuse, membranous, to 2 cm. long, flesh-colored without, reddish puberulent within; stamens red, the tube about half as long as the petals; ovary pubescent as calyx, 5-celled, stigma 5-parted; fruit wings semicircular, reticulate veined, to 7.5 cm. wide, membranous; cells 1-seeded, the oblong seed acute both ends.—Some-

times more than 30 meters tall, the huge trunk considerably smaller at base than the flask-shaped upper portion, the crown small, open; the Peruvian specimen has four leaves from one tree, the largest with petiole 13 cm. long, blade 27 cm. wide, 23 cm. long, the 3 broad acutish lobes about a fourth as long; other leaves about half as large; it seems probable that later leaves may have the 5–7 lobes described for the original tree.

Dr. E. L. Little, Jr., of the Forest Service, U. S. Dept. of Agriculture, thoughtfully shared with me (in 1949) his correspondence with Dr. Petersen, who apparently first discovered the tree in Peru and called attention to the few leaf-lobes; he found the tree limited to two small areas.

In part of the range of the species the sweet oily seeds are eaten and the mild oil used in food and medicinally.

Tumbez: El Caucho and in ravine Trapazola, *G. Petersen* (det. Elbert L. Little, Jr.). To Panama. "Pretino."

Cavanillesia umbellata R. & P. Prodr. 97. *pl. 20.* 1794. *Pourettia arborea* Willd. Sp. Pl. 3: 844. 1800. *C. cordata* [R. & P.] Spreng. Syst. 3: 125. 1826. *C. arborea* (Willd.) Schum. in Mart. Fl. Bras. 12, pt. 3: 237. 1886, probably only as to name.

Trunk stout, enlarged medially, the wood spongy; leaves unknown in type but said to be cordate; flowers umbellate; pedicels about 6 mm. long; petals 2 cm. long, elliptic, obtuse, canescent without, red, stamens about half as long.—Willdenow merely renamed the Ruiz and Pavón tree but Schumann took up his name for Brazilian collections, which possibly are referable to *C. hylogeiton.*

Flowers precocious, short lived, the rapidly forming fruits with 4–5 big wings appearing like a multitude of small lanterns on the branches; to 30 meters tall or taller, the wood so soft that two men felled a tree with a few strokes, though they could not embrace the swollen trunk; crown nearly spherical; the native name refers to the use of the bark for drum hoops (Ruiz & Pavón). F.M. Neg. 23786.

Huánuco: Near Pozuzo, *Ruiz & Pavón,* type. Brazil? "Huancarssacha," i.e., "arbol del tambor."

8. QUARARIBEA Aublet

Matisia Humb. & Bonpl. Pl. Aequin. 1: 9. 1805.

Trees or shrubs with entire pinnately nerved leaves but 3–10-nerved from the base and solitary or fasciculate flowers often sub-

sessile in the axils or on lateral 2–3-bracteolate peduncles. Calyx irregularly 2–5-lobed. Petals 5, linear to oblong-obovate. Stamen column with 5–6 episepalous teeth at apex or more or less parted, the 6–15 stamens with 2-celled anthers. Ovary 2–5-celled, each cell with 2 (–3) ovules. Stigma sub-bilobed or capitate, sometimes 5-sulcate, rarely the style lobed, the stigmas capitate. Fruit sub-drupaceous, coriaceous-fibrous, indehiscent, 1–5-seeded.—The differences between *Matisia* and *Quararibea* are not constant enough to justify retaining both of them as Baillon, Adansonia 10: 146. 1871 (Hist. Pl. 4: 155. 1873), and Vischer, Bull. Soc. Bot. Genève sér. 2. 11: 199. 1919, demonstrated (Cuatrecasas); actually the diagnostic characters are variously developed, all species considered; nevertheless, to avoid the problem, I retained both genera in my original preparation of this account but later discovered the statement of Cuatrecasas; at time of press, he has published under both names. In this group of families number of ovary-cells is often variable, and therefore not of prime importance in classification. It seems to me obvious that this is another instance where practical taxonomy may employ a single group name without disturbing the classification, this equally satisfied by subgeneric indications. *Matisia*, as a section, still commemorates, for the historically interested, M. Matis, "one of the most distinguished artists of the Royal Botanical Expedition" (to Colombia).

The foliage of most species has been described as having an aroma reminiscent of curry, of fenugreek (*Trigonella*) or of the inner bark of slippery elm, in accordance, probably, with the earlier experiences of the writer.

Leaves little or scarcely narrowed to the broadly rounded and more or less cordate 5–10-nerved base; fruits (known) 4–5-celled and -seeded; stamen tube more or less parted.

Leaves suborbicular, strongly cordate, about as broad as long.

Indument of leaves obscure or lacking.....*Q. cordata.*

Indument obvious, especially on leaves beneath..*Q. stenopetala.*

Leaves rather oblong-elliptic, longer than wide, inequilateral. *Q. rhombifolia, Q. inaequilatera.*

Leaves more or less narrowed from about the middle to the 3-nerved base, this rarely openly or minutely cordate at petiole.

Ovary 5-celled; stamen tube deeply parted unless in *Q. lomensis.*

Calyx not alate, 2–3 cm. long, one side often parted to base.

Leaves scarcely narrowed to the openly cordate base. *Q. huallagensis.*

Leaves narrowed to the acute or rarely rounded base.

Calyx indument red or orange tomentose (in Peru).

Calyx base rounded; indument soft. . . . . *Q. lasiocalyx.*

Calyx base narrowed; indument scabrous. . *Q. ochrocalyx.*

Calyx indument yellowish-green.

Calyx unequally parted; fruits 2–3-celled. *Q. oblongifolia.*

Calyx 4–5-dentate; fruits often 5-celled. *Q. putumayensis.*

Calyx alate carinate, scarcely 1.5 (–2) cm. long. *Q. lomensis, Q. bracteolosa.*

Ovary 2-celled; stamen tube obsoletely to shortly 5-dentate; calyx 1.5– scarcely if ever quite 2 cm. long except *Q. velutina, Q. machin.*

Flowers 3.5–4.5 cm. long.

Stigma peltate; calyx nerves fine or hidden in indument.

Calyx 4 mm. wide medially; petals suboblong, 3 mm. wide. *Q. machin.*

Calyx 7 mm. wide medially; petals obovate. . . . *Q. velutina.*

Stigma bilobed; calyx strongly nerved. . . . . *Q. amazonica.*

Flowers about 2 cm. long.

Calyx tubular, to 1 cm. long; leaves glabrous. . . . . *Q. Duckei.*

Calyx campanulate, about 1.5 cm. long; leaves at least younger often lepidote. . . . . *Q. Wittii.*

Quararibea amazonica Ulbrich, Verh. Bot. Ver. Brandent. 50: 91. 1908.

Similar to *Q. machin* but said to lack the strong odor of *Trigonella* and the broader calyx conspicuously nerved and angled, the obtuse subspathulate petals to 11 mm. wide and barely exceeding the stamen tube, this about 33 mm. long, and, especially, the stellate style with 2 strongly dilated tomentose lobes about 5 mm. long, the peltate stigmas 2.5–3 mm. across.—Type 10 meters high. The herbarium specimen of Klug is strongly scented, but it seems to have the bilobed style, apparently unique. F.M. Neg. 9552.

Loreto: Florida, Río Putumayo, *Klug 2192* (det. Cuatrecasas). Amazonian Brazil. "Mutseguinia" (Huitoto).

Quararibea bracteolosa (Ducke) Cuatr. Lloydia 11: 191. 1948. *Matisia bracteolosa* Ducke, Bot. Técn. Inst. Agron. Norte, Belém 4: 17. 1945.

Younger branchlets, petioles, these 3–13 mm. long, peduncles, 12–18 mm. long, and calyces without rufous tomentose, the last remarkable by the lateral extension of 5 longitudinal ribs into wing-like appendages to the 5 elongate-triangular lobes; stipules subulate, canescent tomentose; leaves oblong-obovate, cuneate attenuate to base from the upper third, shortly and abruptly acuminate, 1.5–3 dm. long, 5.5–13 cm. wide, flexible-papyraceous, more lustrous beneath than above, pubescent both sides with some fasciculate rigid trichomes, more frequently asperous on the nerves, these prominent beneath, the veins reticulate; peduncles with 3 apical bractlets 1–1.5 cm. long, 5–8 mm. wide at base, long-acuminate, persisting; calyx 1.5–2 cm. long, tubular, white sericeous within, subtruncate at base; petals apparently white, 2.5–3 cm. long, to 8 mm. wide at broadened apex, whitish tomentose without, reflexing, the glabrous stamen tube about as long, the lobes 8 mm. long; fruits conical ovoid enclosed by the cupulate calyx, this with 5 well-developed longitudinal crests.—Moist places of upland forests, Tabatinga, (*Ducke 1782*).

Peru: No doubt, as now collected at the boundary as noted above. Amazonian Brazil.

Quararibea cordata (Humb. & Bonpl.) Vischer, Bull. Soc. Bot. Genève sér. 2. 11: 206. *figs. 1, 2, 3.* 1919. *Matisia cordata* Humb. & Bonpl. Pl. Aequin. 1: 10. *pls. 2a, 2b.* 1805.

Much branched above a straight cylindrical rugose trunk, the branchlets green; petioles hardly as long as the cordate suborbicular leaves, these to 3 dm. long and nearly as wide, membranous, glabrous, 7-nerved at base; fascicles of 3–several pale rose flowers on the branches, the pedicels with 2 or 3 bracts near base; calyx 2–5-lobed, tomentose within and without; corolla sub-bilabiate, about half again as long as calyx, 2 petals a little smaller than the other 3, all obovate; stamen tube with 5 linear lobes with about 12 anthers on each lobe; style shorter than stamens, puberulent as the 5-angled ovary, the stigma 5-sulcate capitate; fruit oval, 1–1.5 cm. long, tomentose, 5-celled, 5-seeded.—Type of *Matisia.* Tree, 15 meters, light brown bark, thick gummy yellow sap (Mexia); attains 40 meters, said to be cultivated for its edible fruits.

San Martín: Cultivated, Tarapoto, *Spruce 4214.* Moyobamba, *Weberbauer 4671.*—Huánuco: Above Cayumba, *Mexia 8305* (det.

Standley). Pozuzo, *Ruiz & Pavón.*—Junín: Chanchamayo, *Weberbauer 1952.*—Loreto: Río Itaya, *Williams 170; 3515.* Near Iquitos, *Klug 1470; Killip & Smith 27273.* Yurimaguas, *Killip & Smith 27652.* Caballo-cocha, *Williams 2182.* Mouth of the Ucayali, *Tessmann 3087* (det. Ulbrich). Adjacent Brazil; Ecuador. "Zapote," "sapote de monte," "sapotillo."

Quararibea Duckei Huber, Bull. Soc. Bot. Genève sér. 2. 6: 186. *fig. 3.* 1915.

Branches and branchlets slender, the younger as the petioles (1 cm. long) and tubular-campanulate calyces (7–10 mm. long) furfuraceous tomentulose; stipules 3 mm. long; leaves elliptic, slightly oblique at obtuse base, obtusely short-acuminate, to 2 dm. long, nearly half as wide, glabrous, membranous, indistinctly 5–7-pli-nerved, the venation prominent beneath including the reticulate veins; flowers on terminal or pseudo-lateral branches; pedicels 5 mm. long, minutely bracteolate at base; calyx 7–10 mm. long, the lobes unequal, 3 or 4, rounded; petals spathulate, less than 2 cm. long, 4–5 mm. wide near the rotund or obliquely lanuginate tip, subequaling the furfuraceous-lepidote stamen tube, this shortly (2 mm. long) 5-dentate, 4–6 anthers per lobe; ovary 2-celled, the stigma dilated; fruit immature but with 2 seeds.—Transitional to *Matisia* (Huber). Tree 15 meters on terra firma, flowers white (Krukoff). F.M. Neg. 9553.

Río Acre: Near mouth Río Macauhán, *Krukoff 5721.* Amazonian Brazil; Guiana?

Quararibea huallagensis (Cuatr.) Macbr., comb. nov. *Matisia huallagensis* Cuatr. Phytologia 4: 476. 1954.

Robust sulcate branchlets sparsely stellate-pilose; petioles rigid, about 2 cm. long, tomentulose; leaves oblong-elliptic, rounded-cordate at base (apex unknown), apparently about 2.5 dm. long and half as wide, glabrous, rather conspicuously reticulate veined both sides, the 6 or so lateral nerves prominent beneath; flowers opposite the leaves, solitary, the peduncles 5 cm. long, gradually enlarged toward apex, densely ochraceous tomentose with stellate and fasciculate trichomes; buds elliptic-oblong, 3 cm. long, with 4 apical auricles 2–3 mm. high; calyx densely tomentose, little striolate, 3 cm. long, coriaceous, attenuate at base, irregularly 4-lobed, the lobes 5–6 mm. long, somewhat plicate-alate; petals to 5 cm. long, 8–10 mm. wide at the obtuse tip, glabrous within, stellate-tomentose without, subequaled by the puberulent stamen column, this with

5 linear lobes 8–10 mm. long, the few anthers 4–5 mm. long; fruit rotund-depressed, seemingly 5-celled, rounded at base, flat at top, appressed tomentose, nearly 5 cm. broad, 2–8 cm. high, the subelliptic seeds about 2.5 cm. long, 1 cm. broad, the subenclosing calyx coriaceous, the peduncle robust.—Distinguished from the other species of the section *Matisia* by the cordate leaves.

Loreto: San Ramón, Yurimaguas, *Williams 4572* (det. Ulbrich, *Q. guianensis*). "Huayhuash sapote."

Quararibea inaequilatera Cuatr. Lloydia 11: 187. 1948.

Known to attain 20 meters; petioles rigid, 7.5 cm. long; leaves strongly oblique, ovate-elliptic, rather deeply emarginate at base, one side narrowly and truncately lobate, the other lobe much longer, rounded, apically obtuse or apiculate, rounded, to 3 dm. long or longer, about 2 dm. wide, green and glabrous above except lightly puberulent nerves, densely stellate-tomentose beneath; nerves palmately radiating, 10, elevated, with 2 lateral ones most prominent, secondary lateral nerves 7, ascending, the transverse veins reticulate; peduncles on trunk, 2 cm. long, sparsely pilose; fruits pyriform in cupulate calyx, stellate-tomentose, 2.5–3 cm. long, 5-celled, the 5 seeds 2 mm. long.—Unique among the 3 other species with asymmetrical leaves in the pyriform fruit, tomentose leaves (author).

Peru (undoubtedly). Adjacent Colombia.

Quararibea lasiocalyx (Schum.) Vischer, Bull. Soc. Bot. Genève sér. 2. 11: 206. 1919. *Matisia lasiocalyx* Schum. in Mart. Fl. Bras. 12, pt. 3: 239. 1886.

Glabrous except petioles, these 1–2 cm. long, enlarged both ends, stipules (5–6 mm. long), peduncles and flowers, the indument tomentulose, this ferrugineous on the peduncles (2 cm. long) and calyces (20–23 mm. long); leaves oblong-elliptic or -lanceolate, rounded or subcuneate at base, acuminate, often 3–4 dm. long, 7–10 cm. wide at the middle, membranous, 3- or obscurely 5-nerved; calyx campanulate, 8–9 mm. in diameter; petals oblong-spathulate, rounded at apex, 2.5 cm. long, 7–8 mm. wide, subtomentose above, glabrescent toward narrowed base, finely puberulent within; stamen tube finally twice as long, tomentose only without above the base, 5-lobed; stigma simple.—Fruit depressed obconical, 6 cm. high, 7 cm. wide, in the horizontally dilated calyx appearing like a slightly concave plate, 5.5 cm. across; the finely areolate and rugulose fruit

is covered with a tenuous brown tomentum (Ducke). Illustrated, Schumann, l.c. *pl. 48.*

Loreto: Balsapuerto, *Klug 3025* (det. Cuatrecasas). Amazonian Brazil.

Quararibea lomensis Cuatr. Lloydia 11: 187. 1948.

Like *Q. putumayensis* at least as to leaves, but the nervation more elevated; fruiting peduncles 1–1.5 cm. long with 1–3 persisting apical bracts, the calyx 4–5-lobed, 14–18 mm. high, fruit ovoid-subpyriform, 25–28 mm. long, 12–15 mm. broad.—The Peruvian collection has elliptic-obovate leaves to about 1.5 dm. long, half as wide, attenuate to rounded or acute base, acutish, chartaceous, minutely and sparsely scurfy stellulate below on the basal prominent nerves, the conspicuous reticulate venation apparent on the upper surface; peduncles and calyces, these 1.5 cm. long, brownish stellulate puberulent, the lobes seemingly (from dried calyx) carinate-alate; petals glabrous within, lightly sericeous without, oblong-spathulate, about 2 cm. long; stamen tube 3 cm. long, shortly dentate, the anthers few.—Perhaps not distinct from *Q. bracteolosa* (Ducke) Cuatr. Fruit edible; flowers white; 8 meters tall (Klug).

Loreto: Florida, Río Putumayo, *Klug 2039* (det. Cuatrecasas). Adjacent Colombia. "Zapote."

Quararibea machin Macbr., spec. nov.

Ut videtur *Q. guianensis* peraffinis, foliis oblongo-ellipticis, obtuse acutis, circa 2 dm. longis, 8–10 cm. latis; floribus lateralibus, 4–5 cm. longis; pedicellis 5–10 mm. longis; calycibus irregulariter 4–5-lobatis.—The species of Aublet is apparently unknown within Peru but this collection simulates it except for the smaller flowers borne laterally and the more lobed calyx, this with a tendency even to split on one side; as in the related species it is very slender, finely striate and minutely tomentulose as the linear petals both sides and the tardily exserted stamen-tube. The fruit is unknown, but in all probability is also 2-celled as indicated by the similar stigma. Type 8 meters high, trunk 4 dm. in circumference, flowers white, leaves slightly aromatic.

Loreto: River bank, Gamitanacocha, Río Mazán, *Schunke 290*, type (det. Standley, *Q. guianensis*). "Machin."

Quararibea oblongifolia (Poepp. & Endl.) Vischer, Bull. Soc. Bot. Genève sér. 2. 11: 206. 1919, as *oblongiflora*. *Matisia oblongifolia* Poepp. & Endl. Nov. Gen. & Sp. 2: 35. *pl. 150.* 1838.

Small glabrous tree, the erect trunk about 5 cm. in diameter; branches few, slender, flexible; petioles 3.5–6 cm. long, angled; leaves elliptic-oblong, rarely obovate, acute at base, shortly and obtusely acuminate, 2–3 dm. long, 8–11 cm. wide at the middle; peduncles terete, 3–4 cm. long; calyx obconic or campanulate, unequally 3–5-parted, one side always slit to base, 2.2–2.5 cm. long, 10–12 mm. wide at apex, finely rugulose; petals oblong-obovate, very obtuse, 28 mm. long; stamen tube medially 5-parted, puberulent within; drupes ovoid, obtuse, 2–3-celled.—Strange that this has not been collected since the type; possibly there has been a misinterpretation in character and it will be found to include one or more of the more recently described forms.

Loreto: Yurimaguas, *Poeppig*, type.

Quararibea ochrocalyx (Schum.) Vischer, Bull. Soc. Bot. Genève sér. 2. 11: 206. 1919. *Matisia ochrocalyx* Schumann in Mart. Fl. Bras. 12, pt. 3: 238. 1886.

Younger slender terete branchlets, petioles (3–4 cm. long), peduncles (2–3 cm. long) and especially calyces orange-ochraceo-tomentulose with multiradiate trichomes; leaves broadly oblong or obovate-lanceolate, acute at base, shortly and abruptly acute or cuspidate, 3-pli-nerved, 1–2 (3) dm. long, 5–7 cm. wide; calyx campanulate, attenuate at base, (1.5) 2–3 cm. long, irregularly 3–4-dentate; petals oblong-spathulate, rounded at tip, 2.5–4.5 cm. long, 7–9 mm. wide, subtomentose without, finally glabrous within, the stamen tube twice as long, tomentose only without; fruits ovoid, nearly enclosed in the rough puberulent calyx, at least 3 cm. long, 2 cm. in diameter.—Tree to 15 meters tall or taller of upland forests. Wood of this species like that of *Quararibea* (Record). Determinations by Standley except as noted. *M. lasiocalyx* has similar fruits but brown sericeous tomentose, calyx thinner (Ducke).

Loreto: Florida, *Klug 2205*. Yurimaguas, *Williams 4420*. Iquitos, *Killip & Smith 27020; 27025* (det. Ulbrich); *Williams 3791; Klug 1110; 1137*. Río Itaya, *Williams 3389*. Pebas, *Williams 1576*. Balsapuerto, *Killip & Smith 28622*. Río Nanay, *Williams 648* (det. Ulbrich). To French Guiana. "Macacha-ey" (Klug), "machinñaccha" (Schunke), "zapotillo" (Williams).

Quararibea putumayensis Cuatr. Lloydia 11: 186. 1948.

Slight tree with ochraceous-green branches and calyces, these densely and minutely sublepidote-stellate tomentulose, glabrous

subcoriaceous leaves; stipules linear-lanceolate, acute, 1 cm. long; petioles stout, 6–16 mm. long; leaves elliptic-lanceolate, attenuate both ends, apiculate at apex, often 1.5–3 dm. long, 4.5–11 cm. wide, basally triplinerved and with 4–5 secondary nerves arcuate-ascending; peduncles 3 (–4.5 in fruit) cm. long; calyx coriaceous, tubular-campanulate, 2 cm. long, the 4 or 5 triangular teeth obtuse or acutish, sericeous villous within; petals to 3 cm. long, about a third as wide, white, villous without, sparsely pubescent above; stamen tube 5 cm. long, with 5 linear obtuse divisions 6.5–8 mm. long, anthers 6; fruit indurate in herb., densely brownish-green tomentulose, often 5-celled, 5-seeded, 2.5 cm. long, 3 cm. broad.—Similar and perhaps also in Peru is *Q. lomensis* Cuatr. l.c., 187, the leaf nerves more elevated, peduncles 1–1.5 cm., with 1–3 persisting apical bracts, fruiting calyx cupulate, more or less 4-lobed, 14–18 mm. high, fruit ovoid-subpyriform, 25–28 mm. long, 12–15 mm. broad. Here, by my key, largely expedient, would be sought *Q. lecythicarpa* (Ducke) Cuatr. (*Matisia*, Ducke, Bol. Técn. Inst. Agron. Norte, Belém 4: 18. 1945), the calyx indument tomentulose apparently as in *Q. lasiocalyx* but the fruits depressed pentagonal instead of pyriform.

Loreto: Soledad, Río Itaya, *Killip & Smith 29727* (fide Cuatrecasas). Adjacent Colombia.

Quararibea rhombifolia (Cuatr.) Macbr., comb. nov. *Matisia rhombifolia* [Standl.] Cuatr. Phytologia 4: 478. 1954. *Q. rhombifolia* Standl. Bol. Mus. Hist. Nat. Lima 4: 476. 1940, name.

Branchlet tips, petioles, these about 6 cm. long, and the very prominent 9 basal leaf nerves beneath more or less ferrugineous with a dense stellate-tomentose indument; leaves subobovate, somewhat pandurate, openly cordate at base, rounded at apex, the few known about 2–2.5 dm. long, to 6 cm. wide, dark green but minutely and sparsely stellulate above, the conspicuous secondary nerves and reticulate veins puberulent beneath with fascicled or simple trichomes; peduncles 2.5 cm. long; fruit subglobose, mucronate at apex, about 3.5 cm. thick, 5-celled, the 5 seeds about 16 mm. long, 7 mm. broad.—To 15 meters tall, the round-tapering fruit appearing velvety golden-brown at a distance, coarse-textured in hand (collector).

Huánuco: In jungle at 630 meters, Shapajilla, *Woytkowski*, type.

Quararibea stenopetala (Standl. & Cuatr.) Macbr., comb. nov. *Matisia stenopetala* Standl. & Cuatr. Phytologia 4: 568. 1954.

Small pubescent tree, striking by reason of its relatively large orbicular deeply cordate leaves—several dm. across—and its red-violet flowers with petals to 5 cm. long but only 6 or 7 mm. wide; indument early ferrugineous tomentose, the leaves becoming glabrate above, the nerves and reticulate veins beneath finely and rather densely stellate puberulent; pedicels fasciculate, 2.5–3 cm. long, stellate-tomentose; calyx tubular, 1.5 cm. long, 5 mm. broad, pale ochraceous stellate-tomentose, sericeous within, unevenly 3–4-lobate; petals membranous, pubescent only without, the trichomes simple; stamen column tomentose, 4 cm. long, the 5 linear antheriferous lobes 8 or 9 mm. long, the 6 cells contiguous; style stellate-setose, the stigma capitately lobed; fruit globose, tomentose, 5-celled, 5-seeded, the persisting calyx coriaceous.—Affine, according to authors, *Q. bicolor* (Ducke) Cuatr. (*Matisia bicolor* Ducke), Archiv. Jard. Bot. Rio Jan. 3: 210. 1922, with different leaves and indument, calyx and stamen-column. To 20 meters tall, the flowers borne on the main stems. F.M. Neg. 9561.

Loreto: Balsapuerto, *Klug 2972*, type. Mouth of the Santiago, *Tessmann 3983* (n. sp., Ulbrich, in herb.).

Quararibea velutina Cuatr. Phytologia 4: 475. 1954.

Rugulose branchlets at tips, petioles, these 5–7 mm. long, and linear-lanceolate acute stipules (about 11 mm. long) tomentulose; leaves subelliptic, oblong-elliptic or slightly obovate, oblique at obtuse or rounded base, obtuse or obtusely apiculate at apex, 9–14 cm. long, 4–6 cm. wide, minutely and sparsely stellulate above, the secondary nerves there obvious, sparsely stellate-pilose beneath and the 5 secondary nerves there prominent; flowers solitary; peduncles about 1 cm. long, 2–3-bracteolate above the base, enlarged toward the apex, velvety tomentose as the tubular-conical 16 mm. long calyx without with trichomes stellate or fasciculate, the branches fine and coarse, villous sericeous within, sub-trilobed; petals white, linear, membranous, about 4 cm. long, 8–10 mm. wide near the rounded tip, narrowed to base, stellate pilose both sides; stamen column 3.5 cm. long, stellate tomentose, the 5 obtuse lobules 2 mm. long, the anthers 5-seriate, about 6 cells in each series; style pubescent, strongly enlarged at apex; ovary 2-celled, the cells biovulate.—Allied to *Q. loretoyacensis* Cuatr. but leaves and flowers different in size and, especially, pubescence of calyx similar to that of *Q. ochrocalyx*.

Loreto: Río Mazán, *José Schunke 235*, type (det. Standley, *Matisia ochrocalyx*). "Machinñaccha."

Quararibea Wittii Schum. & Ulbr. Verhandl. Bot. Ver. Brandenb. 50: 90. 1908.

Appearance of *Q. ochrocalyx* but more allied to *Q. machin;* stipules lanceolate, 5 mm. long; petioles 1–1.5 mm. long, much enlarged beneath the oval leaf-blade, this obtuse or narrowed at base, obtuse or subacuminate at apex, about 1.5 dm. long, 8–11 cm. wide, early almost microscopically lepidote-stellate, soon glabrescent, the midnerve and pinnate nerves very prominent beneath; peduncles to 2 cm. long or longer; calyx infundibuliform-campanulate, yellowish with minute stellate-lepidote indument, about 1.5 cm. long, unequally (3 and 6 mm.) bilobed, the 4 oblong segments rather obtusely acuminate, sericeous tomentose within, in fruit to 2 cm. long, lignescent; petals 2.5 cm. long, canescent stellate, the stamen tube nearly as long, shortly 5-lobed, the anthers sessile; style subpeltately 5-lobed, ovary 2-celled; fruit oblong-ovoid, densely lepidote-stellate; seeds about 1 cm. long, 3 mm. across.—Type 8–12 meters, (Tessmann) tree trunk 1.5 dm. in diameter. F.M. Neg. 9556.

San Martín: Chazuta, *Klug 4141* (vel affine).—Loreto: Mouth Río Santiago, *Tessmann 4233* (det. Ulbrich). Yurimaguas, *Williams 4869* (det. Ulbrich).—Río Acre: *Ule 9592.* Amazonian Brazil. "Sapotillo," "huyuash-sapote."

STERCULIACEAE. Cocoa or Cola Family

Usually stellate-pubescent soft-wooded trees or shrubs (rarely climbing) with alternate stipulate simple serrate or lobed leaves and panicled or cymose often showy flowers, the petals if present 5 and contorted in bud, the 5 (or 3) sepals connate, valvate. Stamens many and connate or few and nearly distinct; anther cells always 2 or more, globular or linear. Ovary free with 2–5 (rarely 10–12) more or less connate styles or in *Waltheria* only 1, sessile or stiped, each with 1 or more ovules. Fruit dry or fleshy, usually 5-celled, loculicidally dehiscent or separating into folicles or cocci.

Cocoa (and therefore chocolate) is supplied by the bean-like seeds of the fruits of *Theobroma* (*T. Cacao* L.) of South America, while Cola or Kola nuts (*Cola acuminata* (Beauv.) Schott & Endl.) are native to West Tropical Africa; the family is important economically also as the source of several fibers.

Flowers hermaphrodite; petals present.

Petals soon caducous.

Ovary as stamens on long stipe finally longer than spiralled fruit; petals red or white.....8. *Helicteres.*

Ovary sessile or shortly stiped, fruit not spiralled; petals brown-purple or in *Guazuma* yellowish.

Ovary (as fruit) smooth; anthers 2 or more in each stamen-tube sinus; leaves ample.

Petals produced into an elongate narrow appendage; leaves digitate.....5. *Herrania.*

Petals with a short spatulate appendage; leaves entire. 6. *Theobroma.*

Ovary (as fruit) tuberculate or spinescent.

Anthers 3 in each stamen-tube sinus.....7. *Guazuma.*

Anthers 1 in each stamen-tube sinus.

Petals smooth or with stiped gland; fruit tubercled. 3. *Ayenia.*

Petals appendaged; fruit spinescent.....4. *Buettneria.*

Petals withering, persisting.

Ovary 5-celled.....1. *Melochia.*

Ovary 1-celled.....2. *Waltheria.*

Flowers unisexual or polygamous, apetalous; leaves ample, divided or lobate.....9. *Sterculia.*

1. MELOCHIA L.

Shrubs, herbs or trees, stellate pubescent or sometimes with simple trichomes but these not or rarely intermixed, stipulate serrate leaves and usually small flowers variously disposed in the axils or terminal. Calyx campanulate, rarely inflated, 5-dentate or parted. Petals 5, marcescent, plane, opposite the 5 more or less connate stamens, staminodia none or minute. Ovary 5-celled, the cells 2-ovuled; styles 5, free or united medially. Capsules 5-valved, the cells sometimes separating completely as 1 (2)-seeded cocci.

M. hirsuta Turcz., Bull. Soc. Nat. Mosc. 36, pt. 1: 570. 1863, based on *Mathews 1552* without data, is essentially a *nomen nudum* the few lines of description without diagnostic characters, but possibly it is *M. tomentosa;* it is a pity that there is not a general revision of the group as will be apparent from the following synopsis of the Peruvian species.

Leaves subrotund or in any case rounded apically, at most about 3 cm. long.

Stems slender, trailing; capsules pyramidal.....*M. crenata.*

Stems stout, erect; capsules apparently globose....*M. peruviana.*

Leaves longer than broad or in any case mostly or all much larger.

Flowers all in dense usually sessile axillary clusters; capsules depressed-globose.....*M. nodiflora.*

Flowers variously disposed other than above.

Inflorescence (at least principal) an interrupted terminal spike of dense sessile purplish flowers; capsules 5-lobed globes, the cocci bivalved.....*M. villosa.*

Inflorescences various, often axillary, sessile or peduncled cymes or corymbs or if terminal more or less paniculate or infrequently spiciform.

Flowers purplish, mostly pedicelled, cymose-umbellate; capsules pyramidal.

Calyces to 4 mm. long, cymes rather opposite the often glabrate leaves.....*M. pyramidata.*

Calyces 5–6 mm. long; cymes in the axils of the canescent (beneath) leaves.....*M. tomentosa.*

Flowers yellow or white (unknown, *M. pseudonodiflora*), usually many, often subsessile; capsules like 5-lobed globes.

Fruiting calyx papyraceous; petioles slender, 1–2 cm. long; flowers slender-pedicelled in axillary clusters or on axillary branchlets.....*M. lupulina.*

Fruiting calyx firm; petioles stout, the upper rarely 1 cm. long except *M. pseudonodiflora;* flowers in panicles or often peduncled corymbs.

Leaves more or less pilose above with mostly simple trichomes; flowers about 6 mm. long in rather irregular or open inflorescences.....*M. pilosa.*

Leaves stellate-pilose both sides; flowers about 5 mm. long, at least in part in dense corymbs or ample panicles.

Leaves serrulate, shortly petioled; inflorescences subcorymbose.....*M. leucantha.*

Leaves coarsely serrate, slender-petioled; flowers, except lower, in an ample panicle.

M. pseudonodiflora.

Melochia crenata Vahl, Symb. Bot. 3: 86. *pl. 68.* 1794. *M. Chamaedrys* St. Hil. Fl. Bras. Merid. 1: 161. 1825, at least as to Peru?

Trailing suffrutescent, the elongating pilose stems almost filiform and with 1–3 (5)-flowered cymules opposite the roundish crenate-serrate leaves, these 1.5–3 cm. long, glabrate (Peru) above, pilose beneath; stipules ovate-subulate; calyx 4 mm. long, the lobes subulate; petals 5–6 mm. long; stamens about medially connate, the styles basally; capsules pyramidal, the 5 angles rounded, about 1 cm. long, with 2 seeds in each cell.—Petals rose colored with brown veins (Weberbauer). F.M. Negs. 21602; 9600 (*M. Chamaedrys*). There may be two species but the negatives do not suggest it. *M. hermannioides* St. Hil. is similar but the more numerous flowers are subcapitate.

Cajamarca: Prov. Jaén, *Weberbauer 6220* (det. Dahlem, *M. Chamaedrys*). Colombia; Jamaica.

Melochia leucantha Macbr., sp. nov.

Fruticosa 4–8 dm. alta; ramulis, petiolis, foliisque (imprimis subtus) stellulato-puberulentis; stipulis ovato-lanceolatis, ad 3 cm. longis; petiolis 5 (–7) mm. longis; foliis late ovatis interdum fere subrotundatis, basi truncatis vel obscure cordulatis, ad apicem late acuminatis vel rotundatis apice ipso obtusis, plerumque 3.5–4 cm. longis, 3–3.5 cm. latis, serratis, nervis lateralibus subtus conspicuis supra paullo notatis; inflorescentiis subterminalibus mediocriter contractis circa 5–8 cm. latis et longis, pedunculis 2–5 cm. longis, ramulis 5–10 mm. longis, pedicellis 1–3 mm. longis; sepalis subsericeo-pilosis, ovatis, longe acuminatis, firmo-chartaceis, 5–7 mm. longis, petalis paullo brevioribus; fructibus ut videtur depresso-globosis.—As noted by Cuatrecasas in herb. this is not *M. globifera* Tr. & Planch. of Colombia (as determined by Standley) which is well-named; the entire inflorescence in the Peruvian shrub is a broad pseudo-corymb. Noted by the Goodspeed collectors as conspicuous in full flower, the corollas white or white with yellow markings at base; the other specimens cited are placed here on the basis of their reference to the Colombian species and may belong to some other species.

Huancavelica: Gravelly shrub-lands, 2,400 meters, east of Mejorada, *Goodspeed Exped. 10908*, type.—Apurímac: Shrub-land, 2,000 meters, Río Pachuchaca, *Goodspeed Exped. 10546*.

Melochia lupulina Swartz, Prodr. 97. 1788. *Mougeotia inflata* HBK. Nov. Gen. & Sp. 5: 330. *pl. 484.* 1823.

Often a meter or more high and suffrutescent below, the slender virgate branches early stellate puberulent; stipules and petioles slender; leaves ovate, sometimes broadly, serrate, subcordate to rounded-truncate at base, acute or short-acuminate, soon glabrate or persistently a little pubescent beneath, membranous, commonly 5–8 cm. long and more than half as wide; flowers slender pedicelled but densely clustered in the leaf-axils or on axillary branchlets or in corymbs, these sometimes pedunculate; petals white, yellow at center, little longer than the calyx, this about 4.5 mm. long, in flower soon inflated-accrescent, membranous and pale in fruit; filaments medially united; capsules about 3 mm. high, puberulent, the cocci opening slightly at separation along the inner angle.—Illustrated, Fawcett & Rendle, Fl. Jam. 5: 163 (flowers and fruit). F.M. Neg. 35380 (*M. inflata*).

Cajamarca: Cascas, *Raimondi* (det. Ulbrich). Tambillo, *Jelski 282* (det. Szyszyl., *M. inflata*).—Piura: *Raimondi* (det. Ulbrich).—Libertad: Trujillo, *Killip & Smith 21501* (det. Standley).—Junín: Colonia Perené, *Killip & Smith 25064* (det. Standley).—Huánuco: Near Huánuco, *2060*.—Lima: Chorillos and Miraflores, *Martinet; Raimondi*. San Lorenzo near Callao, *Andersson*. Chosica, *496*. Near Lima, *Ball*.—Loreto: Yurimaguas, *Poeppig 2425; Spruce 3898*. To Central America; West Indies.

Melochia nodiflora Swartz, Prodr. 97. 1788.

Resembles *M. lupulina* but the dense usually sessile clusters with conspicuous bracts, the calyces not at all or little accrescent in fruit; flowers pink or rose-striped; filaments completely connate; capsules depressed-globose.

Peru (undoubtedly). Bolivia; Colombia to Mexico; West Indies.

Melochia peruviana Desr. in Lam. Encycl. 4: 83. 1797(?); cf. Journ. Bot. 4, 4: 318. 1906.

Tomentose in all parts, the lignescent branches about 1 dm. long; leaves oval, obtuse or acutish, serrate, very shortly petioled; stipules lanceolate, caducous; flowers axillary, solitary (–5), citron yellow, the peduncle about as long as petioles; calyx segments lanceolate, acute, slightly shorter than the oblong-ovate clawed petals; ovary globose, tomentose, the 5 reddish styles shorter than the basally united stamens.—After Lamarck, who gives the type locality as "Peru." Perhaps a part of *M. depressa* Mill. of Cuba, as illustrated by Cav., Diss. 6: *pl. 173, fig. 1*, but the Cuban plant

noted by Lamarck as having larger leaves, roseate flowers, probably different fruit (depressed, pentagonous), by Grisebach as similar to *M. venosa*. The petioles are 3–7 mm. long, leaves 1–3 cm. long and about as wide, densely white stellate-tomentose especially beneath; flowers about 5, axillary-fasciculate, white with a yellow center, the clusters shortly peduncled. F.M. Neg. 29771.

Huánuco: Near Huánuco, *2324; Ruiz & Pavón; Dombey*, type.

Melochia pilosa (Mill.) Fawcett & Rendle, Fl. Jam. 5: 164. 1926. *Sida pilosa* Mill. Gard. Dict. ed. 8. 1768. *M. venosa* Swartz, Prodr. 97. 1788. *Mougeotia polystachya* HBK. Nov. Gen. & Sp. 5: 328. *pls. 483, 483a.* 1823, fide Fawcett & Rendle. *Melochia polystachya* (HBK.) Tr. & Pl. Ann. Sci. Nat. sér. 4, 17: 341. 1862. *M. venosa* Swartz var. *betonicaefolia* [R. & P.] Schum. in Mart. Fl. Bras. 12, pt. 3: 37. 1886.

Pilose-sericeous shrub sometimes 1 meter tall with notably nervose leaves especially beneath and narrow or sometimes branched terminal and axillary panicles; stipules linear-lanceolate, 7–8 mm. long; petioles rather stout, usually about 1 cm. long; leaves typically about 4–8 cm. long, about half as wide, apparently sometimes much larger; calyx 5 mm. long, the lobes acuminate; petals 6.5–8 mm. long, yellow, apparently sometimes white; filaments completely connate; capsule depressed-globose, villous, the finally separating cocci splitting apically by 2 short valves. F.M. Negs. 9609 (var.); 23866 (var.).

Cajamarca: Valley of the Tabaconas, *Weberbauer 6244*. Jaén, *Weberbauer 6200*.—San Martín: Tarapoto, *Williams 5802; 6685*.—Huánuco: Cuchero, *Poeppig 1269*. Below Río Santo Domingo, *4212*. Tingo María, *Soukup 2246*. Near Pozuzo, *4761?*—Cuzco: Prov. Convención, *Soukup 911; Vargas 793*. Lares Valley, Prov. Calca, *Weberbauer 7932* (det. Ulbrich). Echarate, *Goodspeed Exped. 10506* (det Standley). West Indies; Tropical South America.

Melochia pseudonodiflora Hochr. Ann. Cons. Jard. Bot. Genève 21: 430. 1920.

Ferrugineous tomentose or pilose, especially toward the top; petioles to 14 mm. long; leaves ovate, mostly a little cordate, coarsely serrate, to 3.5 cm. long, about 1.5–2.5 cm. wide, stellate-pilose both sides, basal nerves 3–5, villous, prominent beneath; flowers 1–3 in axils of reduced leaves, the uppermost forming an ample panicle, the pedicels 2–3 mm. long; calyx stellate-pilose,

glabrescent within at base, about 5 mm. long in fruit, the lobes half as long, the obovate petals little longer, inserted slightly above the short subcylindrical stamen column this bearing apically the scarcely applanate filaments; styles free; capsules globose, sulcate, pubescent, the 5 carpels separating and dehiscing loculicidally. —Much resembles *M. nodiflora* but leaves a little thicker, serrations better marked and, especially, lacking the inflated stamen column with broad short filaments, the petals not decurrent on its base (author).

Peru(?): Without locality, *Ruiz* [*& Pavón*], type.

Melochia pyramidata L. Sp. Pl. 674. 1753. *Sida Mathewsii* Turcz. Bull. Soc. Nat. Mosc. 36, pt. 1: 565. 1863, fide Baker, Journ. Bot. 30. 1892.

Slender-stemmed, suffrutescent at least below, rarely 1 meter tall, usually glabrate or the ovate or oblong-lanceolate leaves not infrequently (at least in Peru) more or less cinerous stellate pubescent; cymes sessile or pedunculate, opposite the slender petioles, usually few (–10) -flowered; calyx 3.5–4 mm. long, the lobes lanceolate-subulate, the purplish-pink petals twice as long; capsules 5–6 mm. high, somewhat broader, acutely angled.—*S. Mathewsii* not seen.

Cajamarca: Cascas, *Raimondi* (det. Ulbrich).—San Martín: Tarapoto, *Williams 5840* (det. Standley).—Junín: Colonia Perené, *Esposto* (det. Ulbrich). Chanchamayo Valley, *Schunke 1537*. La Merced, *5312*. Uspachaca, *1310*.—Lima: Near Lima, *Savatier 405*. —Loreto: Río Paranapura, *Klug 3927* (det Standley). Widely distributed in the warmer regions of the New World and naturalized elsewhere.

Melochia tomentosa L. Syst. Nat. ed. 10. 1140. 1759. *M. Turpiniana* HBK. Nov. Gen. & Sp. 5: 323. *pl. 482*. 1823.

Shrubby, more or less canescent with a close stellate indument the broadly ovate to oblongish leaves most densely so beneath; flowers in lax or dense axillary or terminal cymes mostly obviously pedicelled; calyx 5–6 mm. long, the narrow lobes acuminate the usually purplish petals about twice as long; capsules broadly pyramidal, rostrate, the angles more or less rounded.—F.M. Negs. 23865 (var.); 35386 (*M. Turpiniana*).

Peru (possibly). To southern North America; West Indies.

Melochia villosa (Mill.) Fawcett & Rendle, Fl. Jam. 5: 165. 1926. *Sida villosa* Mill. Gard. Dict. ed. 8. 1768. *M. hirsuta* Cav.

Diss. 6: 323. *pl. 175.* 1788. *M. vestita* Benth. in Hook. Journ. Bot. 4: 130. 1842, fide Uittien.

Well-marked by the dense sericeous villous pubescence usually spreading on the long younger branches that terminate in spiciform inflorescences composed of dense sessile or subsessile clusters, these bracteolate and sometimes bracted by reduced leaves; calyx 4 mm. long, the violet petals nearly twice as long; capsule globose, the 5 cocci finally completely separating and dehiscing.—In the specimen of Cavanilles by Jussieu the flowers are in a globose head and axillary in sessile fascicles, probably a young state. F.M. Negs. 35388 (*M. vestita* Benth.); 35389 (*M. hirsuta*).

Cajamarca: Sucse River Valley, Socota, *Stork & Horton 10102?* Fence rows, Chota, *Stork & Horton 10046* (young; det. Standley, *M. globifera*).—San Martín: Tarapoto, *Williams 5798; 6149.* San Roque, *Williams 7102.* Zepelacio, *Klug 3705.* To Mexico and the West Indies.

2. WALTHERIA L.

Resembles *Melochia* but indument always entirely stellate, ovary 1-celled, the capsule bivalved.—The flowers are densely glomerate, the leaves velvety tomentose in the Peruvian species, at least beneath.

Leaves usually ovate-rotund, subequally yellowish tomentose both sides; filaments free above ..... *W. ovata.*

Leaves usually ovate-oblong or ovate-elliptic, less whitish tomentose above; filaments completely united ..... *W. americana.*

Waltheria americana L. Sp. Pl. 673. 1753. *W. indica* L., l.c. *W. erioclada* DC. Prodr. 1: 493. 1824.

More or less suffrutescent and canescent with a tomentose indument that extends to the sessile or pedunculate bracted axillary and terminal globose inflorescence, least dense on the upper surface of the leaves; petioles often only 5–10 mm. long; leaves generally ovate-oblong or -lanceolate or subelliptic, rounded or subcordate at base, obtuse or slightly acute, usually 3–6 cm. long, serrate; calyx 4–5 mm. long, the lobes lanceolate-subulate, little exceeded by the bright yellow petals; style not longer than the connate filaments; capsules 2 mm. long.—F.M. Negs. 8002; 23849 (*W. erioclada*).

Arequipa: Mejía, (*Guenther & Buchtien 189*, det. Bruns).—Apurímac: (*Weberbauer 5877*, det. Ulbrich).—Cuzco: Savanna,

Prov. Convención, *Weberbauer 7945* (det. Ulbrich); *Raimondi*. New World tropics and naturalized in the Old.

Waltheria ovata Cav. Diss. 6: 317. *pl. 171*. 1788. *W. reticulata* Hook. f. Trans. Linn. Soc. 20: 231. 1847. *W. sericea* Turcz. Bull. Soc. Nat. Mosc. 31, pt. 1: 214. 1858, fide Svenson.

Prostrate or bushy and erect (Svenson), sometimes 2 meters tall, equally covered by a felt-like yellowish-white indument; leaves commonly cordate-ovate, rarely linear-oblong, rounded at tip, more or less obviously reticulate veined especially beneath, often 3–6 cm. long, 2.5–4.5 cm. wide; flowers yellow, mostly in several sessile clusters often borne along together on short axillary branchlets; petals 5 mm. long, exceeding the densely pubescent calyx; style longer than the partly free filaments.—*W. incana* R. & P. ined. is the same. The sulphur yellow color of the leaves is characteristic (Svenson). Illustrated, Svenson, Amer. Journ. Bot. 22: 244. *pl. 3*.

Piura: Payta, *Gaudichaud; D'Urville*. Negritos, *Haught 3*. Lower Pariñas Valley, *Haught 118*.—Ancash: Ocros, *Weberbauer 2653*.—Huánuco: Chulki, *Sawada 48*. Huacho, *Stork & Horton 9412*. Near Huánuco, *2043; Kanehira 267; Rivero; Ruiz & Pavón*.—Lima: Amancaës, *André*. Chosica, *534*. Near Lima, *Soukup; Raimondi*. Callao, *Dombey; Jussieu*, type; *Gaudichaud*. Surco, *Martinet*. San Bartolomé, *Savatier 492*.—Ayacucho: Río de Lomas, *Weberbauer 5745* (det. Standley). Ecuador; Galapagos. "Membrillejo" (Raimondi).

3. AYENIA L.

Much like *Guazuma* but subherbaceous or more or less suffrutescent, the calyx 5-parted, the slender-clawed petals cucullate and more or less cleft at apex and, especially, the anthers (sometimes 3-celled) solitary in the sinuses of the very short staminal tube, the ovary cells only 2-ovuled.—Besides the following, *A. magna* L. may occur; it is a shrub with ovate-cordate acuminate leaves soft-pubescent beneath, 5–9 cm. long, 4–6 cm. wide and perhaps (Svenson, Amer. Journ. Bot. 33: 469. 1946) has been found in adjacent Ecuador. Named for the Duc d'Ayen.

Leaves acutely acuminate, the coarse serrations strongly unequal. *A. serrata*.

Leaves obtuse or acute, the small serrations irregular but subequal.

Stems erect, the ascending branches villous. . . . . *A. erecta*.

Stems as branches diffuse, glabrate, retrorsely puberulent or tomentulose.....*A. pusilla.*

Ayenia erecta Mart. Fl. Bras. 12, pt. 3: 103, *pl. 23, fig. 1.* 1886.

Erect from fibrous root, the stem simple or with many spreading-ascending densely leafy branches villous with spreading trichomes, to 2 dm. high; petioles 5–10 mm. long; stipules filiform, 1 mm. long; leaves oblong-elliptic, acutish or obtuse, narrowly cordate at base, 2–3 cm. long, 14–17 mm. wide, the lower and uppermost much smaller, irregularly serrate, sparsely appressed pubescent above, finely villous beneath; pedicels usually in threes, filiform, equaling the calyx, this 2 mm. long, the lanceolate 1-nerved acuminate segments hirsute without, subglandular within; petals 3 mm. long, red, the capillaceous claw purple; gynophore 3 times longer than stamen tube, this 0.7 mm. long; capsules depressed globose, finely echinate with fragile spines, the seeds deeply and irregularly foveolate.—Apparently ex char. and illustration, l.c., distinctive, and presumably determination correct but originally from Bahía, Río San Francisco near Joazeiro.

Cajamarca: Callacate, (*Jelski 321*, det. Szyszylowski). Brazil.

Ayenia pusilla L. Syst. Nat. ed. 10: 1247. 1759.

Subdecumbent-ascending or the many stems or branches suberect, sometimes several dm. tall, the sparse to numerous trichomes short, recurved; leaves usually basally ovate- or elliptic-oblong, ordinarily 1–1.5 (4) cm. long, rarely more than 1.5 cm. wide, closely serrulate from subtruncate or openly cordate base to the apiculate truncate or acutish tip; flowers reddish-purple, solitary or 2–3-fasciculate, calyx deeply and acutely lobed, 2–3 mm. long, the petals with slightly longer capillaceous claw and roundish bilobed limb; ovary long-stipitate; capsules depressed-globose, 3 mm. long, 4-5 mm. broad, pubescent or glabrate, more or less short-echinate. —Illustrated, Mart. Fl. Bras. 12, pt. 3: *pl. 24.*

Lima: Ambar to Huacho, *Stork 11468* (det. Johnston).—Huánuco: Near Huánuco, *Ruiz & Pavón; Kanehira 225; Soukup 2227.* Ambo, *3169.*—Huancavelica: Colcabamba, *Weberbauer 6441.*—Cuzco: Cunyac, Prov. Anta, 2,050 meters, *Vargas 9430.* Widely distributed.

Ayenia serrata Ruiz, in herb.

Fruticosa ad 5 dm. alta ramulis junioribus subherbaceis dense retrorseque puberulis; petiolis gracilibus circa 1.5 cm. longis; foliis

ovatis, plerumque circa 5 cm. longis, 2.5 cm. latis, basi rotundatis, acute acuminatis, irregulariter serratis, membranaceis, glabris vel subtus sparse hispidulis; pedicellis filiformibus 3–5 mm. longis, 3–5-fasciculatis; sepalis petalisque ut videtur albidis vel petalis purpureis, tenue unguiculatis, exsertis; capsulis ignotis.—The original material probably collected by Tafalla as labeled from Guayaquil and noted in herb. by Mildbraed as apparently a new undescribed species. J. R. Lawrence has labeled the Peruvian collections as new, using a name in reference to the irregular serrations, the teeth being of two sizes, but the publication not found.

Tumbez: Rainy green formation, 150 meters, Hacienda La Choza, *Weberbauer 7701;* also Hacienda Chicama, 600 meters, *Weberbauer 7672.* Ecuador.

4. BUETTNERIA Loefl.

Reference: Schumann in Mart. Fl. Bras. 12, pt. 3: 83–101. 1886.

Suffrutescent and erect or sometimes scandent or sarmentose, often aculeate, the leaves various, the small purplish or greenish-white or yellowish flowers more or less pedicellate in umbels or now and then in axillary or subterminal sessile or peduncled cymes. Calyx deeply 5-parted, the 5 concave inflexed petals with long linear terminal and 2 small lateral appendages. Stamen tube and petals connate, with 5 sessile 2- or 3-celled anthers. Ovary 5-celled, the cells 2-ovuled; style 5-parted. Capsule globose, echinate or spiny, with partly dehiscing cocci.—There are usually one or more glands on the medial and lateral leaf-nerves beneath; the name has been spelled variously but as in *Luehea* the original may be followed except to indicate the umlaut by the diphthong. Basic characters of the many species are probably in the flowers and fruits but these are unknown in detail for many species; my key therefore is doubtless burdened, for expediency, with characters of doubtful value.

Peduncles and pedicels subfiliform or slender, soon either or both longer than petioles or usually about 1 cm. long; fruits except as noted, unknown; leaves often more or less pubescent beneath.

Leaves about oblong to ovate, sometimes broadly ovate or obovate but obviously longer than wide or small; stems usually more or less aculeate.

Indument if present more or less villous-hirsute; sepals not subfiliform-acuminate.

Plants unless inflorescences glabrous or glabrate; leaves often entire; fruits unknown except *B. glabrescens.*

Leaves about oblong-elliptic, entire or nearly, shortly acuminate or acute.

Leaves ample, 4–9 cm. wide, acuminate. *B. myriantha, B. coriacea.*

Leaves small, about 2 cm. wide, acute. . . *B. rhamnifolia.*

Leaves ovate, long-acuminate, serrate; fruits long-aculeate. *B. glabrescens.*

Plants densely pubescent, at least the serrate leaves beneath; fruits echinate, spines a few mm. long.

Flowers white or yellowish; ovate-lanceolate leaves soon glabrate or glabrous above.

Branches aculeate; trichomes not or little crisped. *B. parviflora, B. cordata.*

Branchlets not aculeate (type); trichomes crisped. *B. eriogona.*

Flowers red; cordate-ovate leaves tardily glabrate above. *B. hirsuta.*

Indument minutely stellate on upper stems, scurfy-tomentose; sepals subfiliform-acuminate. . . . . *B. urosepala.*

Leaves ample, subrotund to broadly ovate, but little longer than wide; stems unarmed. . . . . *B. pescapraeifolia, B. catalpaefolia.*

Peduncles relatively stout, usually shorter than petioles or scarcely 1 cm. long unless in fruit, the pedicels often shorter; fruits unknown, *B. ancistrodonta, B. aurantiaca, B. benensis, B. peruviana, B. eriogona;* species glabrescent except *B. divaricata, B. discolor.*

Petioles subtending flowers about 5 mm. long; leaves never lepidote-stellate, stems (types) armed, not densely pubescent.

Leaves obtuse or barely acute; fruits long-aculeate. . . . *B. ovata.*

Leaves obviously acute or acuminate.

Leaves rugosely nerved beneath, acute or very shortly acuminate; fruits short-echinate. . . . . *B. Weberbaueri.*

Leaves finely nerved, acuminate; fruits long-aculeate (known).

Leaves ovate-lanceolate, about 2 cm. wide, serrate toward tips; stems terete or subquadrate only in age. *B. tereticaulis.*

Leaves if ovate broader, usually about elliptic; stems more or less angled or leaves entire or subentire.

Leaves often distinctly 2–3-serrate below the caudate acumen, notably reticulate; petal appendage inflated.....*B. ancistrodonta.*

Leaves entire or subentire, not very reticulate; petal appendage compressed or little dilated.

Leaves oblong-elliptic; petal appendage subfleshy. *B. aurantiaca.*

Leaves ovate; petal appendage little dilated. *B. peruviana.*

Petioles subtending flowers about 1 cm. long or longer or if shorter leaves pilose or lepidote-stellate beneath and stems unarmed.

Leaves glabrous or glabrate, mature at base acute, rounded or subcordate; fruits long-aculeate (known).

Stems not aculeate (types).

Leaves long-acuminate, abruptly coarsely serrate. *B. benensis.*

Leaves short-caudate, serrulate.....*B. boliviana.*

Stems aculeate; leaves short-acuminate.

Leaves somewhat serrate toward tips; peduncles and pedicels subequal.....*B. aculeata.*

Leaves quite entire; peduncles often a little longer than short pedicels.....*B. Tessmannii, B. acuminata.*

Leaves softly pubescent beneath; fruits short-echinate. *B. divaricata.*

Leaves rufescent beneath with a compact minute indument. *B. discolor.*

Buettneria aculeata Jacq. Sel. Stirp. Amer. Hist. 76. 1763. *B. carthaginensis* Jacq. Sel. Stirp. Amer. Pict. 41. 1780. *B. lateralis* Presl, Rel. Haenk. 2: 144. 1835.

Shrubby, the hollow angled stems or branches armed with recurved prickles and usually tangled or scandent; leaves rounded-ovate to oblong-lanceolate, very variable in size, ordinarily membranous and crenate or serrate toward the tip, glabrous to rarely densely pilose-tomentose beneath; flowers almost minute, brown-purple or green, the sessile or often pedunculate and umbelliform

cymes few-flowered; fruit body 7–10 mm. broad, glabrous or densely pubescent, armed with many long slender or stout hard spines.—Synonymy and description after Standley and Steyermark, Fieldiana: Bot. 24, pt. 6: 406. 1949, who remark that "no good basis for separating any of the Central American forms is apparent." This situation seems to exist in the case of one or more Peruvian species, which perhaps ought to be included in this variable (?) entity, but the problem is one for a student who can acquaint himself with the plant of Jacquin.

Peru (possibly). To Mexico.

Buettneria acuminata Bredem. ex Roem. & Schult. Syst 5: 470. 1819.

Stems terete or nearly, glabrous, the prickles 2–3 mm. long; petioles to 1 cm. long; leaves ovate or oblong, entire, rounded or crenate-rounded at base, long-acuminate, to 5 cm. long, half as wide, puberulent only beneath at base and in nerve axils; inflorescence consisting of 1–3 2–3-flowered umbels, the puberulent peduncles and glabrous pedicels to 7 mm. long; calyx 3 mm. long, the lanceolate acuminate segments 2 mm. long with some longer trichomes at the angles; petals 4 mm. long, claw 1 mm. long, obovate-lanceolate, the lateral processes triangular, ligule linear, subclavate apically, puberulent only basally; staminodia 3-dentate, puberulent at tip; capsules 8 mm. in diameter, spines 1.5 cm. long, the black seeds with purple chalaza and raphe, 5 mm. long, 2 mm. thick.—After Schumann. Collectors of Peruvian material have noted the flowers as rose and cream colored, greenish-yellow or -white. *Tamayo 275* from the type region, Venezuela, a well-prepared specimen seen at the University of California, seems to match the Peruvian material, but the relationship of the ubiquitous (presumably) *B. aculeata* is open to question. It pleases me greatly to record here the cooperation given me by Herbert Mason and the staff of the University Herbarium—a great collection effectively ordered and maintained, constantly important in the preparation of this work. F.M. Neg. 9805 (Bredemeyer), which was not seen until after preparation of this account.

San Martín: Chazuta, *Klug 2987; 4017* (both det. Standley).—Junín: Puerto Yessup, *Killip & Smith 26293* (det. Mildbraed). La Merced, *5592?*—Loreto: Yurimaguas, *Poeppig 2360; Spruce 3900* (both det. Schumann). Balsapuerto, *Klug 2987* (det. Standley). Venezuela.

Buettneria ancistrodonta Mildbr. Notizbl. Bot. Gart. Berlin 11: 142. 1931.

Glabrous, the branchlets and leaf-nerves aculeate; petioles scarcely 5 mm. long; leaves elliptic-lanceolate, obtuse at base, subcaudate-acuminate, 6–11 cm. long, 2–4.5 cm. wide (or to 18 cm. long, 8 cm. wide), toward apex with 1–3 crenate serrations, the 6–8 lateral nerves and densely reticulate veins prominent; pedicels very short; sepals ovate-lanceolate, acute, 4–4.5 mm. long; petal claw broadly linear, cucullate, little dilated, the lateral processes fleshy, clavate, divaricate, 1 mm. long, the narrowly ovoid fleshy appendix 1.4 mm. long, obtuse; staminodia 2 mm. long, the hamate middle tooth much longer than the wing-like lateral.—Extraordinary in the inflated petal appendage and the form of the elongate staminodia teeth (author); flowers dark brown to carmine (Tessmann). The Puerto Limón specimen was at one time referred to *B. coriacea*. F.M. Neg. 17935.

Loreto: Soledad on the lower Itaya, *Tessmann 5294*, type. Puerto Limón on the Marañón, *Tessmann 3861*. Río Mazán, *Schunke 84*. Mishuyacu near Iquitos, *Klug 1593* (det. Standley, *B. acuminata*).

Buettneria aurantiaca Mildbr. Notizbl. Bot. Gart. Berlin 11: 141. 1931.

Branchlets shortly aculeate, the younger as the petioles, these to 1 cm. long, sparsely puberulent with crisped trichomes; leaves oblong-elliptic to lanceolate, rounded and more or less cordate at base, obtusely acuminate, entire or irregularly and distantly crenate-dentate above, only the younger both sides on the midnerve with some scattered trichomes, basally 3- or obsoletely 5-nerved, the 6 or so lateral nerves with transverse veins prominent beneath; peduncles about 2 mm. long, pedicels little longer; sepals ovate-lanceolate, acutely acuminate, scarcely 3 mm. long, very sparsely pilosulous; petal claw scarcely 1 mm. long, lateral processes rather semilunate, semifleshy, stout appendix compressed, obtusish, 1–8 mm. long, glabrous, orange; medial staminodia tooth very broad, obtuse. —The species is recognizable by the orange lanceolate somewhat fleshy petal appendix (Mildbraed). F.M. Neg. 17936.

Loreto: Flood-free wood, Soledad, *Tessmann 5292*, type.

Buettneria benensis Britton, Bull. Torrey Club 16: 155. 1889.

Scandent, unarmed, glabrous except for a few scattered stellate trichomes on the branches and petioles, these 3–4 cm. long, and

a minute indument on the leaves beneath, these strongly cordate, ovate, sagittate or ovate-lanceolate, long-acuminate, serrate, distinctly nerved and reticulate veined, 8–13 cm. long, 5–7 cm. wide; peduncles short; calyx hirsute, the lanceolate sepals 5 mm. long.—Resembles *B. cordifolia* Sagot of French Guiana but smooth (Britton), and in view of the variation in this respect of *B. glabrescens* and doubtless other species, it may indeed be a part of Sagot's species; type from junction of Beni and Madre de Dios rivers, Bolivia, and thus to be expected within Peru.

Peru (probably). Bolivia.

Buettneria boliviana Britton, Bull. Torrey Club 16: 155. 1889.

Glabrescent, unarmed liana with cordate ovate acuminate serrulate leaves 6–8 cm. long, 4–5 cm. wide, reticulate veined both sides, the petioles slender; capsules 1–5 cm. long, 2 cm. in diameter, the spines 2–3 mm. long; seeds 5 mm. long, 2 mm. broad, glabrous, black.—With *B. benensis*, of which, ex char., it seems to be the fruiting state, but actually, as indicated in the key, it must be distinct; however, types of neither of these were seen until after preparation of this compilation.

Peru (probably). Bolivia.

Buettneria catalpaefolia Jacq. Hort. Schoenbr. 1: 21, *pl. 46.* 1797; 91.

Unarmed finally nearly glabrous liana, the stems terete, the petioles slender, several cm. long, the leaves subrotund or basally ovate, usually a dm. or two long, acutely acuminate, sometimes especially the younger minutely or floccosely stellulate pubescent beneath and with 5 prominent nerves from the subtruncate or more or less cordate base; cymes axillary or terminal, lax, pedunculate, often ample; flowers white; sepals 5–6 mm. long; petals 10 mm. long, claw 2 mm. long, lateral processes minute, ligule 8 mm. long, finely acuminate; fruit body globose, 2.5–3.5 cm. in diameter, the slender prickles sharp; seeds 8 mm. long, 6 mm. in diameter, reddish with yellowish raphe, purple chalaza.—Illustrated, Mart. Fl. Bras. 12, pt. 3: *pl. 20.*

Cajamarca: Above Ocros, stream banks, Weberbauer, 163.—San Martín: Zepelacio, *Klug 3386.* Juanjuí, *Klug 4242.* Tarapoto, *Spruce 4956.*—Huánuco: Chicoplaya, *Ruiz & Pavón* (det. Mildbraed).—Loreto: Balsapuerto, *Klug 2857; 2949.* Yurimaguas, *Poeppig 2262; Killip & Smith 28351.* To southern Mexico.

Buettneria cordata Lam. Encycl. 1: 522. 1785. *B. sulcata* R. & P. Fl. Peruv. 3: 10. 1802? *B. corchorifolia* Turcz. Bull. Soc. Nat. Mosc. 25, pt. 2: 152. 1852.

Stems diffuse, pilosulous, more or less angled and sulcate, aculeate (as rarely petioles and leaf midnerve beneath); petioles to about 1 cm. long; leaves rather densely short-pilose beneath especially on the 3–5 basal nerves, finely serrate base to often obliquely acuminate apex, glabrous or nearly above, cordate-ovate, usually 3.5–5 cm. long, 1.5–2.5 cm. wide (on vigorous shoots to three times as large), the upper often bractiform; peduncles and pedicels filiform, about 1 cm. long, the latter shorter, often somewhat nutant; calyx segments narrowly lanceolate-acuminate, spreading, about 3 mm. long, the filiform-appendaged petals to nearly twice as long; fruits rotund, about 1 cm. in diameter, the short spines 2–3 mm. long; seeds obtusely trigonous, rostrate, scabrous-punctate.—Schumann suggested that *B. sulcata* could be an earlier name for *B. acuminata* Bredem. and I did not find the type at Madrid; however, it seems ex char. to be a part of *B. cordata*, the principal differences noted by the authors being the aculeate petioles and leaf midnerve, characters which of course at once suggest also *B. tereticaulis*, but that is otherwise different; also the locality is in the center of distribution for *B. cordata*. F.M. Negs. 9579; 29763; 23838 (*B. corchorifolia*).

Lima: Quive, Prov. Canta, (*Ruiz & Pavón*, type, *B. sulcata*). Near Lima, *Dombey*, type; *Wawra 2594*. Santa Rosa, *Martinet*. Chancay and Huarai, *Ruiz & Pavón*. On Río Santa Eulalia, 1,700 meters, *Horton 10992* (det. Johnston, *B. parviflora*); at 1,400 meters, *Goodspeed & Stork 11483* (det. Johnston, *B. hirsuta*). River bottom, Chosica, *2863*. Ecuador. "Yerba de la Araña" (Ruiz & Pavón).

Buettneria coriacea Britton, Bull. Torrey Club 16: 156. 1889.

Glabrous except for many-flowered inflorescences; branches terete, sparsely aculeate; petioles stout, 1 cm. long; leaves oblong-lanceolate, 12–14 cm. long, 4–5 cm. wide, coriaceous, prominently nerved beneath; pedicels and bracts pubescent; sepals tomentose, ovate, acute, 2 mm. long.—Mildbraed, Notizbl. Bot. Gart. Berlin 11: 141. 1931, has added the following from the Tessmann collections: petioles 5 mm. long, rugulose; leaves papyraceous, narrowly ovate or ovate-lanceolate, rounded or obtuse at base, gradually long-acuminate, to 7 cm. wide, lateral nerves 8 or 9, the densely reticulate veins more conspicuous above than below; peduncles

very slender, 1 cm. long, the pedicels scarcely half as long; sepals lanceolate, acutely acuminate, 4 mm. long; petals 3 mm. long, claw 1.5 mm. long, slender lateral processes little deflexed, fleshy appendage dorsally compressed, especially marginally, ciliate, staminodia hardly 1 mm. high; ovary tuberculate.—Well-marked by the black-red (dried) petals with fleshy lanceolate brown ciliate appendage (Mildbraed); liana, to 10 meters, 5 cm. in diameter, much branched (Tessmann). Type from junction of the rivers Beni and Madre de Dios, Bolivia, peduncles 6–8, pedicels 3–4 mm. long; veins lax, same both sides.

Loreto: Soledad, *Tessmann 5291*. Pongo de Manseriche, *Tessmann 4104*. Leticia, *Williams 3171* (det. Mildbraed). Florida, *Klug 2301; 2310; 2330* (both distr. as *B. ancistrodonta?*). Bolivia.

Buettneria discolor Benth. in Hook. Journ. Bot. & Kew Misc. 3: 165. 1851; 92.

High-climbing, unarmed, the branchlet tips ferrugineous tomentulose as the younger petioles, these finally 1–2 cm. long; leaves oval or some oblong-lanceolate, rounded to subcordate at base, very shortly acuminate, acute or obtusish, mostly about 1 dm. long (–1.5), 7 cm. wide, coriaceous, glabrous and drying brownish red above, minutely lepidote-stellulate beneath; inflorescence of 3–5 umbels, 3–6-flowered, the puberulent peduncles and pedicels to 5 mm. long; calyx tomentulose only without, 4 mm. long, the segments ovate, acute; petals purple, 4 mm. long, claw obcuneate, the lateral processes little incurved, fleshy, as the lanceolate acuminate ligule; staminodia emarginate, carinate; anthers barely free; capsules 1.5 cm. in diameter or larger, densely aculeate with stout spines about 2 mm. long.—Illustrated, Mart. Fl. Bras., 12, pt. 3: *pl. 21*.

Loreto: Río Mazán, *José Schunke 166* (det. Cuatrecasas). Amazonian Brazil.

Buettneria divaricata Benth. in Hook. Journ. Bot. 4: 124. 1842; 100.

Younger scandent divaricate branches minutely aculeate, tomentulose; petioles 6–15 mm. long; leaves orbicular-ovate to broadly oblong-lanceolate, cordate to truncate at base, serrulate, 5–10 cm. long, half as wide, scabriusculous above, tomentulose and 3–5-glandular on nerves near base beneath; peduncles stout, short, bearing 4–5 umbels of 5–7 flowers; pedicels puberulent; calyx 5 mm. long, the lanceolate segments acuminate, hirsute without and within

at tip; petals 5 mm. long, cucullate, the lateral processes horizontal, triangular, rounded at apex, the thick ligule puberulent at acuminate tip, dilated at base; staminodia acute, serrate, stamens sessile, the anthers approximate; pistil tubercled; capsules 1.5 cm. in diameter, tomentose, the approximate conical prickles 3 mm. long.—After Schumann. Has been collected as near as Solimões. F.M. Negs. 19637; 35435.

Peru (probably). To British Guiana.

Buettneria eriogona Mildbr. Notizbl. Bot. Gart. Berlin 11: 144. 1931.

Puberulent-tomentulose with crisped simple trichomes especially the younger branchlets, petioles, these to 12 mm. long, and leaves beneath the branches soon glabrate except the obvious angles, unarmed; leaves cordate-ovate, acutely acuminate, 4–6 cm. long, 3–4.5 cm. wide, minutely crenulate, the crenations apiculate, 5 (–7)-nerved from base with 3–4 additional lateral nerves; inflorescences or peduncles about 1 cm. long; sepals free nearly to base, ovate-lanceolate, 3 mm. long; claw of petals strongly incurved, the thin linear lateral processes erect-divaricate, appendix filiform, about 5 mm. long; staminodia short, broadly retuse.—The species is characterized by the indument and by the erect-spreading appendages of the petals (Mildbraed); it is, I think, a part of *B. cordata* Lam. F.M. Neg. 17938.

Lambayeque: Hacienda de Chinama, *Raimondi 411*, type.

Buettneria glabrescens Benth. Bot. Voy. Sulphur 71. 1844.

Stems (these rarely aculeate, Svenson) and younger leaves puberulent, the older glabrate, ovate-lanceolate, rounded or rarely subcordate at base, acuminate, serrate, mostly 5–10 cm. long, at least half as wide or upper narrower; peduncles 12–25 mm. long, 6–10-flowered, the buds long-acuminate; sepals 3 (–5) mm. long, narrowly lanceolate, sometimes long-acuminate; petal appendages filiform; fruit long-aculeate.—Affine *B. cordata* but glabrate and seems distinct by form of leaves (Bentham). Type from Guayaquil; the stems are marked by 5 light colored ridges, semi-woody, in clumps to more than 2 meters high, rarely show any trace of spines (Svenson; see illustration, Amer. Journ. Bot. 33: 476, *fig. 1*). The southern Peru specimens have larger flowers, shorter peduncles and may be at least varietally distinct; both referred by Standley to *B. cordata* but glabrous and the fruits long-aculeate. See also *B. Dielsii* mentioned under *B. parviflora*.

Piura: Amotape Hills, (*Haught & Svenson 11538*). Pariñas Valley, *Haught 71; 163* (distr. as *B. parviflora*).—Apurímac: Oropeza Valley, 2,700 meters, *Vargas 9771*.—Cuzco: Collcha-Pururo, 2,820 meters, *Vargas 9736*. Ecuador.

Buettneria hirsuta R. & P. Fl. Peruv. 3: 10. 1802; 99.

Stems densely hirsute, much branched, the 5 angles strongly aculeate, the branches less so as the petioles, these 2.5 cm. long; leaves cordate, acute, crenate, 7-nerved, the nerves somewhat aculeate, the indument more softly hirsute beneath than above; peduncles to 3 times as long as petioles, filiform, many-flowered; pedicels umbellate, capillary, unequal; petals lutescent the lower half, purple the upper; otherwise like *B. sulcata* (Ruiz & Pavón); and to this original description Schumann has added: leaves ovate, 10–13 cm. long, 6–9 cm. wide, scabriusculous above or early orange sericeous, the medial and lateral nerves glandular; peduncles to 1.5 cm. long; calyx 5.5 mm. long, hirsute as the lanceolate acuminate segments within; petals 7 mm. long, cucullus 1 mm. long, linear, the lateral processes rotund, glabrous as the filiform ligule; staminodia emarginate, stamens stipitate, anthers free, capsules 16 mm. in diameter with short conical spines.—The leaves of the type are velvety in the manner of those of the more northern *B. mollis* HBK. which may not be distinct. F.M. Neg. 23841.

Huánuco: Pillao, *Ruiz & Pavón*, type. Yanano, *3799* (det. Mildbraed). Muña, *3926*.—Arequipa: Challascapa near Mejía, (*Guenther & Buchtien 4*, det. Bruns). To southeastern Brazil.

Buettneria myriantha Schum. & Ulbr. Verh. Bot. Ver. Brandenb. 50: 91. 1908.

High climbing glabrous liana, the terete branches with a few spines often 3–4 mm. long and 5 mm. wide at base; petioles 6–8 mm. long; leaves oblong-oval, obtuse at base, acuminate (perhaps not always), entire, 1.5–2 dm. long, 7–9 cm. wide, coriaceous, the nerves prominent both sides; flowers about 10, the peduncles 1–1.5 cm. long, the slender pedicels 5 mm. long, both pubescent as the lanceolate sepals, these 2–3 mm. long, basally carinate; ovary densely verruculose.—Perhaps allied to the puberulent *B. discolor* Benth. (authors), but ex char. seems to be a part of *B. coriacea*. F.M. Neg. 23842.

Peru (probably). Brazil.

Buettneria ovata Lam. Encycl. 1: 522. 1785.

Shrub, a meter or two (sometimes 4 meters) high, the 5-angled glabrous branches aculeate on the angles; petioles smooth; leaves ovate, glabrous, serrate, about 2.5 cm. long; flowers axillary, in corymbs or umbels of 3–6, the peduncles and pedicels short; sepals acute; petals trifid at purple apex; capsules spheroid, echinate with five 1-seeded cells.—Lamarck; type grown from seeds collected by Joseph de Jussieu in "Peru," probably rather from the vicinity of Quito (Mildbraed), who cited a number of collections from central Ecuador, Bibl. Bot. 116: 106. 1937. The Peruvian specimen is abundantly aculeate; the leaves of type oval, barely acutish, 2–3 cm. long, 12–15 mm. wide, pinnately nerved above 3 basal nerves these barbate in the axils, sometimes minutely scabrous on nerves, the capsule 1 cm. in diameter, the rather few spines to 7 mm. long. The branches are acutely angled, stout. F.M. Negs. 8003; 29764; 35439.

Libertad: Potaz, *Raimondi 512* (det. Diels). Ecuador. "China-cacha" (Jussieu).

Buettneria parviflora Benth. Pl. Hartw. 114. 1843.

Branchlets aculeate, puberulent, soon glabrate; leaves ovate (or the smaller floral lanceolate), rounded or scarcely cordate at base, acuminate, 5–7.5 cm. long, 3–5 cm. wide, acutely serrate, tomentose beneath and the midnerve glandular; peduncles fasciculate toward the tip of the branchlets in the axils of bracteiform leaves, 8–10 mm. long, bearing umbels of 6–10 flowers; calyx and petal segments ovate-lanceolate, the latter 2 mm. long, acute, puberulent, with divaricate auriculate lateral processes and filiform appendages twice as long as the calyx, scarcely or not enlarged above the middle; spines of fruit short-conical (Bentham).—Included as some Peruvian specimens referred by me to *B. cordata* or *B. glabrescens* have been so determined; however the species is not clearly distinguishable from the former. The apparently well-marked *B. obtusata* Benth. ex Hochr. Ann. Cons. Jard. Bot. Genève 11–12: 5. 1908, of Ecuador, has subrotund leaves, rounded even at apex, canescent pilose beneath. *B. Dielsii* Mildbr. Bibl. Bot. 116: 106. 1937, is very near according to the author but branchlets glabrous or merely puberulent, flowers 5–6 mm. long.

Peru (cf. note above). Ecuador.

Buettneria peruviana Turcz. Bull. Soc. Nat. Mosc. 36, pt. 1: 569. 1863.

Branches definitely scandent, aculeate, finely puberulent; leaves ovate, subcordate, obtusely acuminate, entire, glabrous and puncticulate above, rarely pubescent beneath at base of the 5 nerves, and with a depressed oblong gland on midnerve; pedicels of the few-flowered umbels scarcely longer than the short peduncles; petal appendages little dilated.—Seems to be near *B. brevipes* Benth. of southern Ecuador but the petal appendages not enlarged into an ovate-oblong claw and inflorescences not geminate (author); the leaves of Bentham's species are ovate-lanceolate, subacute at the rounded base. I am indebted to Annetta Carter of the University of California Herbarium for finding this description given in Index Kewensis as "31: 207. 1858."

Amazonas(?): Without data (*Mathews 1652*, type).

Buettneria pescapraeifolia Britton, Bull. Torrey Club 16: 155. 1889.

Glabrous, the slender petioles not aculeate, subequaling the leaves, these orbicular or basally ovate, cordate, obtuse or acute, entire, 8–12 cm. wide, dark green with impressed nerves above, glaucous and prominently nerved beneath; capsules semiglobose, 2 cm. in diameter, very densely muricate.—After the author, who allied it to *B. discolor*.

Junín: Satipo, *Seibert 2373* (det. Killip & Idrobo). Bolivia.

Buettneria rhamnifolia Benth. in Hook. Journ. Bot. & Kew Misc. 3: 164. 1851; 96.

Branches erect glabrous except for the puberulent tips and with a few recurved prickles 5 mm. long; petioles distichous, to 8 mm. long, stout, canaliculate above; leaves oblong-elliptic or -lanceolate, rounded at base, acute to subemarginate, 6 cm. long, 22 mm. wide, coriaceous, entire, glabrous above, puberulent in axils of the nerves beneath, unarmed; inflorescences sometimes in axillary branchlets of 1–3 4–6-flowered umbels, the glabrous peduncles to 1.5 cm. long, the pedicels about as long; calyx glabrous, nearly 4.5 mm. long, the linear-lanceolate long-acuminate sepals soon reflexing; petals dark purple, 8 mm. long, cucullus 1 mm. long, linear, dilated at tip the glabrous wings erect, the ligule long-conical, puberulent; staminodia 3-dentate, anthers free.—The type of *B. Weberbaueri* was referred here by Ulbrich. F.M. Neg. 9592.

Peru (probably). Amazonian Brazil.

Buettneria tereticaulis Lam. Encycl. 1: 523. 1785; 95.

Branches cylindrical, a little pubescent, sparsely aculeate; leaves ovate-lanceolate, scarcely rounded at base, acuminate, about 5 cm. long, scarcely 18 mm. wide; capsules of other species but small and much more densely echinate with divaricate spines 10–12 mm. long. —Lamarck, the type from Peru by Joseph de Jussieu. Schumann suggested that this seems to be near if not the same as *B. sulcata* (*B. acuminata*); in the type the leaves are serrate toward the tip and with a little pilosity at juncture with petiole but not between the basal nerves and the petioles, these 5 mm. on fruiting branch, as the young stems pilose only in a line; nervation pinnate. The stems are quite terete; no specimen from Peru has leaves so narrowly lanceolate but it could be an extreme form of *B. aculeata*.

Peru: Without locality, *Joseph de Jussieu*, type.

Buettneria Tessmannii Mildbr. Bot. Gart. Berlin 11: 140. 1931.

Glabrous unless for some puberulence on the younger branchlets, irregularly aculeate, the petioles, these 1–2 cm. long, smooth or with 1 or 2 prickles; older branches 5-sulcate, the internodes 3–5 cm. long; leaves ovate-elliptic or elliptic, rarely broadly lanceolate, obtuse to shortly cuneate at base, acutely acuminate, 7–12 cm. long, 3.5–6 cm. wide, thin-papyraceous, 3-nerved at base, the lateral nerves (other than basal) 3–4 curved-ascending to the entire margins; peduncles scarcely 1 cm. long, pedicels 2–3 mm. long, the few flowers greenish; sepals 5 mm. long, the triangular acute segments 3 mm. long; claw of petals 1.5 mm. long, basally 1 mm. wide, lateral processes spreading, obtuse, appendix filiform-attenuate, 3 mm. long, little clavate-enlarged; staminodia with acute short hamate middle tooth; capsules (immature) with many prickles 8 mm. long. —No observation by author; it seems to be doubtfully distinct from *B. acuminata* or *B. aculeata* or the specimens cited under the former may belong here. F.M. Neg. 17939.

Loreto: Mouth of the Santiago, *Tessmann 4027*, type.

Buettneria urosepala Mildbr. Notizbl. Bot. Gart. Berlin 11: 144. 1931.

Indument minutely stellulate, on the deeply 5-sulcate shortly aculeate branchlets fulvous-tomentulose; petioles stout, about 5 mm. long; leaves ovate-lanceolate, rounded at base, rarely slightly cordate, gradually acuminate, entire (or remotely and minutely

serrulate), 8 cm. long, half as wide, the younger minutely stellate, punctate above, beneath with some trichomes on the 3–5 prominent basal and about 6 lateral nerves, the densely reticulate veins more conspicuous above; pedicels scarcely 1 cm. long; sepals little connate, lanceolate-ovate, subfiliform-acuminate, 4 mm. long, stellate-pilose; petal claw dilated at base, the thin lateral lobes deflexed, the filiform appendix hardly 5 mm. long; staminodia truncate and excised, barely 1 mm. long.—Without observation by the author. F.M. Neg. 17940.

Junín: Vitoc, *Raimondi*, type. Huacapistana, *Sandeman 4467* (distr. as *B. eriogona*).

Buettneria Weberbaueri Mildbr. Notizbl. Bot. Gart. Berlin 11: 145. 1931.

A shrub 2–3 meters high, the glabrous more or less clearly 5-angulate branchlets armed with strong short recurved prickles, the leaves especially toward the acute tip very acutely but minutely serrate; petioles 5–10 mm. long, crisply pilosulous; leaves often ovate-lanceolate, little cordate, 2.5–5 cm. long, 1.5–3 cm. wide, basally 5-nerved, barbate in the axils of the 6–7 lateral nerves, prominent beneath; pedicels nearly as long as petioles; flowers yellowish-green; sepals glabrous, about 6 mm. long, acuminate; petal claw obovate-spathulate, cucullate, short lateral processes deflexed, filiform appendage 6 mm. long; staminodia hardly 1 mm. high, the minute middle tooth affixed below the retuse margin; capsules globose-ovoid, 1.5 cm. long, 1 cm. in diameter, rather densely armed with prickles 2–4 mm. long.—Readily known by the small but very sharp teeth of the leaves (Mildbraed). F.M. Neg. 17941.

Cajamarca: Above Chota, 2,600 meters, *Weberbauer 4219*, type (det. Ulbrich, *B. rhamnifolia*); *Stork & Horton 10038* (det. Standley, *B. cordata*).

5. HERRANIA Goudot

Reference: Richard Evans Schultes, Caldasia 2, no. 6: 11–26. 1943; 2, no. 9: 325–336. 1944.

Like *Theobroma* but notably marked by the digitately divided leaves and, especially, by the extraordinarily elongate ligule that exceeds the petal base many times, the aestivation cincinnate-involute.—Treated as a section of *Theobroma* by Schumann and

obviously a part of no other genus; nevertheless it constitutes a soundly defined separate group, most conveniently bearing its own name after a General of Colombia (Herran) who became President and, according to the author, consolidated the peace, leading his country into prosperity.

Besides the following, *H. breviligulata* R. E. Schultes, Caldasia 20: 21. 1942; Bot. Mus. Leafl. Harvard 16: 78, 207. *pl. 12.* 1953, from Colombia may be found in Peru; it has softly velvety stellate abruptly acuminate fruits, not at all indented at the peduncle, this 2 cm. long.

Leaves glabrous or essentially, rarely asperous.....*H. nitida.*

Leaves more or less pubescent, at least beneath.

Fruits pubescent, with stinging trichomes.

Sepals equal, entire.

Indument stellate-pilose; leaflets moderately attenuate to base.....*H. Mariae.*

Indument soft, dense; leaflets long-attenuate to base. *H. Cuatrecasana.*

Sepals unequal, the outer often incised.....*H. kofanorum.*

Fruits velvety pilose, with no stinging trichomes; sepals equal, entire.....*H. nycterodendron.*

Herrania Cuatrecasana García-Barriga, Caldasia 1, no. 2: 57, *pl. 2.* 1941.

Similar to *H. Mariae* but, as to type, much smaller, to 3 meters tall with pale maculate bark, indument much softer and denser, and, especially, the leaflets much longer attenuate at base, the lateral about 33 cm. long, 9 cm. wide, the central 5 dm. long, 17 cm. wide, above sparsely stellate, the veins tomentose, beneath stellate-pilose, the veins more prominent; pedicels stellulate-tomentulose, 2–3 cm. long, with a basal linear-filiform, pilose bract; staminodes conspicuous, purple, rhomboid-lanceolate, attenuate to the obtuse or acute apex, 2.5 cm. long, 8 mm. wide; fruit ellipsoid, acuminate, the 10 ribs covered with stinging stellate trichomes, rind thin, brittle, yellow at maturity.—After Schultes, Caldasia 2, no. 9: 329. 1944, who has described fruits found by him and concludes that while vegetatively the species appears to be related to *H. nycterodendron* "comparison of the fruits reveals that they are rather distinct." Illustrated, Schultes, l.c. 330 (photograph, fruits).

Peru (no doubt). Adjacent Colombia.

Herrania kofanorum Schultes, Bot. Mus. Leafl. Harvard 14: 126. 1950.

Habit of other species; trunk to 7 cm. in diameter, the bark scrobiculate and scabrous; branches and branchlets tomentose, finally glabrate; stipules caducous, linear, 2.5–3 cm. long, hispidulous without; petioles stout, obscurely sulcate, densely tomentose, to 3 dm. long; leaflets sessile, notably and regularly undulate-sinuate, lanceolate-oblong, gradually attenuate to base, acute or mucronate acumen to 2 cm. long, coriaceous, unequal but mostly 17–30 cm. long, 6–11 cm. wide, glabrous or evanescently and minutely puberulent above or the veins fusco-hirsute, beneath densely stellate-pilose the veins ferrugineous tomentose; fascicles of flowers on lower trunk, the stout densely stellate-puberulent pedicels about 1 cm. long, the stellate-pilose oblong-globose buds 18 mm. in diameter; sepals strongly unequal, sparsely stellate-strigose without, the rotund-ovate outer one about 1.5 cm. long and broad, often incised for 2 mm. the incision extending as a furrow within to sepal-base, the inner 2 elliptic, acute, 1 cm. long, 6 mm. wide; petals 4 or 5, red-purple, muricate-papillose, 9 mm. long, 7 mm. wide, the filiform ligule much dilated at granular base, to 1 dm. long; staminodes coarsely papillose both sides, acute, 22 mm. long, 6 mm. wide; ovary distinctly 10-costate, densely stellate-pilose; pistil simple; fruit said to be yellow.—After Schultes who compares it to *H. balaënsis* Preuss of Ecuador with subequal sepals all entire. Illustrated, Schultes, l.c. *pl. 28* (habit photograph of flowers); *pl. 34*.

Peru (probably). Adjacent Colombia and Ecuador. "Ko-kee-ot'-chu" (Kofán, Schultes).

Herrania Mariae (Mart.) Decaisne ex Goudot, Ann. Sci. Nat. sér. 3. 2: 233. 1844. *Abroma Mariae* Mart. Denkschr. Bot. Ges. Regensb. 3: 297. *pls. 8, 9*. 1841. *Theobroma Mariae* (Mart) Schum. in Mart. Fl. Bras. 12, pt. 3: 71. 1886.

Rather puberulent-tomentulose especially the leaves beneath including the long (4–5 dm.) basally enlarged petioles and the 2–5-parted roseate calyx (12 mm. long) without, this with basally elliptic, obtuse, subcymbiform segments sparsely pubescent, within the simple trichomes purplish; leaflets 7–9, obovate-rhomboid, the lateral more or less oblique and curved, all attenuate to sessile base, acuminate, herbaceous, light green; inflorescences fasciculate on the trunk, the peduncles to 16 mm. long, squamately bracted at

base, filiform as the pedicels; petal base 6 mm. long, nearly as wide, yellowish with 5 purple nerves, the ligule 1 dm. long, 1.2 mm. wide, with 3–5 purple nerves; stamen tube dark red, usually 3-antheriferous, the granulate apically serrate staminodia 10.5 mm. long; style tomentose, the stigmas 5.—After Schumann and said to attain 9 meters with trunk diameter to 3 dm., the beautiful large leaves forming a subglobose crown. The var. *putumayonis* Schultes, Bot. Mus. Leafl. Harvard 14: 129. 1950, differs in leaflets to 5.2 dm. long, 1.8 dm. wide, lanceolate-elliptic, globose flower buds to 17 mm. in diameter, ligules often shorter; type several trunks in a clump. Dedicated to Queen Mary of Saxony for her interest in botany. Illustrated, Schultes, l.c. *pl. 30* (habit photograph, flowers and fruits); Mart. Fl. Bras. l.c. *pl. 15*.

Loreto: Río Putumayo between Ríos Igaraparana and Yaguas, (*Schultes 4010*, type, var.). Amazonian Brazil. "Mu-se-na" (Witoto, Schultes), "cacohuilla" (Williams).

Herrania nitida (Poeppig) Schultes, Caldasia 2, no. 6: 16. 1943. *Abroma nitida* Poeppig, in Poepp. & Endl., Nov. Gen. & Sp. 3: 73. 1845. *Theobroma nitida* (Poeppig) Schumann in Mart. Fl. Bras. 12, pt. 3: 72. 1886. *H. atrorubens* Huber, Bull. Soc. Bot. Genève, sér. 2, 6: 187. 1914, fide Schultes, Bot. Mus. Leafl. Harvard, 16: 80. 1953.

Slender tree, the large 7–9-foliolate leaves crowded at the apex of the strict trunk, this usually only a few cm. in diameter at base; stipules linear, to 2.5 cm. long, 1 mm. wide, usually stellate-setulose; petioles enlarged at base, to 4 cm. long, appressed stellulate-tomentulose; leaflets sessile or nearly, lanceolate-oblong, attenuate to base, acuminate, the largest middle ones 2.5–4.5 dm. long, 7–14 cm. wide, the often asymmetrical much smaller, firm-chartaceous or subcoriaceous, entire or undulate-margined, glabrous and lustrous above, rarely evanescently on the nerves beneath; flowers in fascicles of as many as 30–40 on the lower part of the trunk; pedicels articulate, densely appressed tomentulose with a few strigose setae, about 5 mm. long, outer sepal yellow-red, stellate-setose without, rotund-ovate, about 9 mm. wide, the elliptic acute inner 2 to 6 mm. wide, twice as long; petal-base broadly obovate, 4–5 mm. wide, 5–6 mm. long, cucullate, most densely muricate without, yellowish-red or roseate, terminating in a pendent coiled pink or scarlet purple-veined linear ligule to 8 cm. long; stamen-tube alternately 2 and 4 antheriferous, the conspicuous staminodes 9 mm. long, 5

mm. wide; stigma simple; fruit ovoid or ellipsoid, acuminate, to 11 cm. long, 5 cm. thick, the 5 primary and 5 secondary thin cutelliform ribs minutely and sparsely hispid with stinging trichomes; seeds subtriangular, 9 mm. long, 8 mm. wide, 5 mm. thick.—To 4 meters tall, the dark or black thin bark smooth or rough. After Schultes. Forma *sphenophylla* Schultes, Bot. Mus. Leafl. Harvard 14: 131. 1950, has narrowly lanceolate-elliptic leaflets, often fewer flowers; var. *aspera* (Karsten & Triana) Schultes, l.c. 130, of adjacent Colombia has asperous leaves, entirely blood-red purple flowers. Determinations by Schultes. F.M. Negs. 32206; 32204 (var. *aspera*). Illustrated, Schultes, l.c. (Caldasia), 17 (photograph of trunk with flowers).

San Martín: Tocache, *Poeppig 1979*, type.—Loreto: Río Mazán, *José Schunke 45* (type, forma). Iquitos, *Killip & Smith 27431*. Caballo-Cocha, *Williams 2332*. On the Amazon, *Williams 2843*. Yurimaguas to Balsapuerto, *Killip & Smith 28234*. Río Itaya, *Williams 3345; 3364*. Peru-Colombia boundary, *Williams 2843; 2816* (var. *aspera*). Adjacent Colombia. "Cacahuilo" (Killip & Smith), "cacahuio" (Schunke).

Herrania nycterodendron Schultes, Caldasia 2, no. 6: 21. 1943.

Usually simple-stemmed little tree sometimes 4.5 meters tall but the trunk less than a dm. in diameter at base, the ample 7-foliolate leaves crowded at the rarely branched apex; stipules caducous, linear, to 4 cm. long, 3 mm. wide, tomentose as the stout terete very obscurely sulcate petioles, these to about 6 dm. long, and the slender pedicels (2–2.5 cm. long) and linear bracts; leaflets sessile, lanceolate-oblong, gradually long-attenuate to base, more or less acutely acuminate (acumen to 2 cm. long), entire or subundulate, the largest to 6 dm. long, 2 dm. wide, firm-chartaceous or papyraceous, somewhat lustrous above, glabrate or sparsely hirsutulous, the veins minutely tomentulose, these densely ferrugineous tomentose beneath, the interspaces stellate-pilose; flower fascicles on the lower trunk to 45-flowered; sepals entire, stellulate-pilosulous without, puberulent within, the outer one rotund-obovate, 19 mm. long, 15 mm. wide, the inner two elliptic, about 15 mm. long and half as wide; petals basally rotund, cucullate, muricate-papillose, pale ochre-purple, 10 mm. long, 8–9 mm. wide, the pendulous membranous ligule filiform, to 1 dm. long, minutely granular only at base, deep purple with prominent black nerves; staminodia reflexed, lanceolate-elliptic, 19–21 mm. long, 7–9 mm. wide, muricate-

granular; ovary pilose, the glabrous style deeply 5-parted; fruit ellipsoid, 10–12 cm. long, 4–5 cm. thick, long-attenuate above and often constricted below the acute or frequently rounded-obtuse tip, indented at the ligneous peduncle (this 4–5 cm. long), minutely but densely velvety stellate-pilose (no stinging trichomes), very deeply 10-costate, the alternate of the broad rounded ribs smaller, the rind hard, fibrous, ashy yellow at maturity, the seeds 9 × 8 × 8 mm., the white pulp edible.—After Schultes, who remarks "immediately set apart from the most closely related species *H. Mariae* and *H. Cuatrecasana* by its curious type of fruit." With a happy imagination he has translated into Greek for the species name the native one at Remanso, "Palo de murciélago," i.e. bat-tree, probably in allusion to the resemblance of the clustered velvety fruits. Illustrated, Schultes, l.c. 22 (photographs of fruits); 26 (drawing of fruit); Bot. Mus. Leafl. Harvard 14: *pl. 35*.

Loreto: Remanso, Río Putumayo, *Schultes 4011*, type. Florida, flowers wine-red, *Klug 2069*. Mishuyacu near Iquitos, *Klug 1588*. Colombia. "Palo de murciélago," "palo de chimbe," "cacao de murciélago," "mu-se'-na," "mu-se'-ge-ke" (last two Huitoto, all by Schultes).

6. THEOBROMA L.

By JOSÉ CUATRECASAS

Cacao [Tournef.] Aublet.

References: G. Bernoulli, Uebersicht der bis jetzt bekannten Arten von Theobroma, Neue Denkschrift allg. Schweiz. Gesellsch. fuer d. g. Naturwiss., 24, 3: 1–15, *pls. 1–7*. 1871; K. Schum. in Mart. Fl. Bras. 12, pt. 3: 70–77. 1886; A. Chevalier, Revision du genre Theobroma, Revue Intern. de Bot. Appl. et d'Agr. Trop., 26: 265–285. 1946.

Tree with usually spreading branches and simple coriaceous, nodding or pendulous, distichous leaves. Stipules small or medium sized, geminate, lateral, deciduous. Leaves penninerved, base often 3–5-nerved. Inflorescence cauline or axillary, cymose, few- or many-flowered. Flowers hermaphrodite, small or medium sized, pentamerous. Calyx 3–5-parted, lobes ovate or triangular, valvate. Petals in aestivation valvate, formed by two articulate parts, the basal one strongly hooded, the superior part laminar, petaloid like an appendage of variable shape, usually oblong or suborbicular. Stamens 5 fertile, alternate with 5 staminodia, all connate at the base, forming a short urceolate tube; the fertile ones opposite the

petals with a short curved filament, at apex 2–3-parted and bearing two or three bilobate anthers; each extrorse anther hidden in the petal concavity and its two lobes divaricate; the staminodia petaloid, broadly or narrowly laminar, acute or obtuse. Ovary sessile, globose, ovoid, or pentagonal, 5-celled with axile placentation and many-ovulate cells; style simple or more or less 5-parted; stigmas simple, acute. Ovule anatropous with dorsal rhaphe and 2 integuments. Fruit usually large, subbaccate, indehiscent, ovoid or oblong, smooth, rugose or 5–10-costate, tomentose, velvety or glabrous; pericarp thick or thin, hard-coriaceous or woody or firmly fleshy, the meso- and endocarp at maturity a pulp enclosing the seeds in a single cavity. Seeds medium sized, ovoid but laterally more or less flatly compressed, integuments filmy, embryo straight, radicle conic, short, inferior, the cotyledons thick lobulate-corrugate; endosperm none or reduced to a mucilage within the rugosities of the cotyledons.

A neotropical genus with 18–20 species distributed in the rain forests of South and Central America, many of them localized endemisms, others very much spread, mostly through cultivation. The seeds of *Theobroma* are appreciated as food and a stimulating beverage (cacao, cocoa, chocolate), and one of its species (*T. cacao* and varieties) constitutes one of the most important economical tropical crops. See C. J. J. Van Hall, Cacao (Macmillan & Co. Ltd., London, 1932). The name *Theobroma*, given by Linnaeus, is derived from the Greek, meaning "food of the Gods" (Theos=God, broma=food).

Stamens biantheriferous.

Inflorescences on the trunk and old branches.

Leaves flexible-coriaceous, glabrous, penninerved; pericarp fleshy..... *T. cacao.*

Leaves rigid-coriaceous, with minutely stellate appressed indument beneath, basal pair of nerves ascendant, distant from the next pair; pericarp coriaceous..... *T. calodesmis.*

Inflorescences axillary; leaves thin-coriaceous, cinereous-tomentose beneath, 5–7-nerved; pericarp ellipsoid, thick, woody, 10-ridged and deeply reticulate-sulcate..... *T. bicolor.*

Stamens triantheriferous.

Inflorescences on the trunk and old branches.

Leaves cuneate, trinerved at base; petal ligule subrotundate; fruit subpentagonal, sulcate, acuminate, umbilicate, about 10 × 5 cm..... *T. calodesmis.*

Leaves at base rotundate, extremely asymmetic, usually 5-nerved; petal ligule spathulate-cuneate; fruit elliptical, smooth 10 × 8 cm. scarcely sinuate-sulcate. *T. speciosum.*

Inflorescences axillary.

Staminodes petaloid, spathulate; leaves pergaminaceous, pale, dense indument cinereous, monotrichous beneath; fruit elliptic-obovate; pericarp coriaceous, tuberculate. *T. obovatum.*

Staminodes petaloid, lanceolate; leaves thick-coriaceous with strong nerves; fruits smooth.

Leaves appressed tomentose, monotrichous beneath, nerves glabrous; fruits large, about 20 cm. long; flowers large. *T. grandiflorum.*

Leaves densely tomentose, heterotrichous beneath, with a ground of cinereous, appressed minute stellate hairs and larger reddish stellate more sparse hairs on the nerves; fruits smaller, about 10 cm. long; flowers medium sized..... *T. subincanum.*

Theobroma bicolor Humb. et Bonpl. Aeq. 1: 104, *pl. 30.* 1808.

Usually a small tree (3–6 meters) which can attain 18 meters, with an erect stem and narrow crown; young branchlets, often horizontal or pendulous, appressed cinereous tomentose by very minute stellate hairs; leaves thin-coriaceous, usually pendulous; petioles 1.5–3.5 cm. long, erect or curved, appressed tomentose; blade ovate-oblong, cordiform at the base, 5–7-palmate-nerved, acute or acuminate, the edges smooth, 1.5–4 dm. long, 6–23 cm. broad, glabrous and green on the upper side, densely and compressed tomentose, lightly cinereous, with minute stellate hairs beneath; principal nerves little conspicuous above and very prominent beneath, the midrib a little thicker with usually 3 secondary curved-ascending nerves at each side, the transversal nerves separated, prominent beneath, the small veins rather prominently reticulate; flowers in small axillary cymes equaling or exceeding a little the petiole; branchlets thin, shortly tomentose and with small linear bracts; pedicels 3–6 mm. long; sepals 5, ovate-lanceolate, 5–6 mm. long, 2–2.5 mm. wide, united at the base, reddish appressed-tomentose without; petal-base obovate, 2.2 mm. long, rotundate and hooded at the apex, the ligule subsessile, ovate-subrotundate, 1–1.2 mm. in diameter, puberulent without, red or purple; staminal tube

1 mm. high, the staminodes purplish oblong, obtuse-lanceolate, obtuse or subacute at apex, densely papillose-tomentose, 3.5–4 mm. long, 0.8–1 mm. broad, the fertile filaments 1 mm. long, bent, bearing 2 anthers, each bicellular; ovary 5-sulcate, densely hirsute-tomentose, subobovoid, 1.8 mm. long, the style glabrous; fruit subglobose-ellipsoid or ovoid, 1.5–2 dm. long, 10–12 cm. in diameter, green-yellowish with green nerves, the exocarp thin, a little velvety, the pericarp hard, lignose, 5–8 mm. thick, strongly reticulate with 5 prominent ribs, the pulp yellowish, sweetish; seeds more or less compressed, ovoid, 20–27 mm. long, 15–18 mm. broad.

The Williams specimens were erroneously listed by him as *T. quinquenervium* Bern. (Woods of Northeastern Peru, Field Mus. Bot. 15: 324. 1936). Origin uncertain but probably Central American. It is widely but not extensively planted from southern Mexico through Central America to the Amazonian basin; the seeds are locally used to make chocolate but are recognized as inferior in quality to those of *T. cacao* L. The pulp is also edible and is used locally to prepare beverages. Its peculiar fruit, elliptic and lignous, and the leaves, which are whitish, somewhat silvery below, make this species easily recognizable, and it has been given many different names in other countries: Central America: "pataiste," "pataste," "patashte," "patasht," "cacao pataxte," "cacao blanco," "cacao de monte." Colombia: "bacao." Ecuador: "patas," "cacao blanco." Brazil: "cabu-assu," "cupuassu," "cupuacu," "cacao do Peru," "cacao baju," "cacao d'anta."

Loreto: Florida, Río Putumayo at mouth of Río Zubineta, clearing, *Klug 2021*. Mishuyacu, near Iquitos, clearing, *Klug 1523*. Paraiso, Alto Río Itaya, 145 meters, *Williams 3346*. Caballo-cocha, on the Amazon River, *Williams 2149*.—Also *Weberbauer 6245* (without locality, at Chicago), "macambo" (Klug, Williams), "majambu" (*Williams 3346*).

Theobroma cacao L. Sp. Pl. 782. 1753.

Tree, usually 5–8 meters high, branches in clusters mostly of 5, spreading, gray, glabrous, the very young ones pubescent; leaves obovate-oblong or oblong, rotundate or obtuse at the base, abruptly acuminate or cuspidate at the apex, glabrous or slightly pubescent beneath, the nerves pinnate, the midnerve very strong beneath but only filiform above, secondary nerves 10–14 at each side, spreading, curved-ascending, slender and prominent beneath, the other veins making a lax small but conspicuous reticulum above and more or

less prominent beneath; petioles 1–2 cm. long, subterete, shortly pubescent or glabrescent; inflorescence on the trunk and on the larger branches in cymes forming small clusters with short tubercular or nodose woody branchlets, eventually with elongated branchlets up to 3 cm. long; pedicels slender, villous, to 1.5 cm. long, with 3 small linear deciduous bracts at the base; calyx pale reddish, the 5 sepals 5–6 mm. long, lanceolate, almost free, glabrous within, subglabrous without, stellate-pubescent marginally; petal-base oblong, hooded, 2.5–3 mm. long, glabrous, appendage obovate-rhomboid, 1.5 mm. long and broad, cuneate and long pediculate (pedicel about 2 mm. long, geniculate), yellowish; staminal tube 1 mm. long, the fertile filaments curled, biantheriferous; staminodia subulate, rather fleshy, minutely papillose, scarcely hirsutulous at the margin toward the base, 4–5 mm. long; ovary ovoid, glabrous as the 2 mm. long style; fruit ovoid or oblong-ovoid, obtuse or acute, usually pentagonal with more or less pronounced rows according to the variety; pericarp thick, firmly fleshy, glabrous, yellowish or reddish at maturity, about 1.5–3 dm. long, the ovoid seeds about 26 mm. long, 18 mm. broad, and 9 mm. thick.

Probably all the specimens found in wild condition in the territory of Peru belong to the subsp. **leiocarpum** (Bernoulli) Cuatr. comb. nov. (*T. leiocarpa* Bern., l.c. 6. *pl. 2, fig. 11.* 1871), which only can be distinguished when with fruits, frequently lacking in herbaria. This subspecies is characterized by its ovoid obtuse smooth pods and violet pigmented cotyledons. This is the form believed to be native in South America, spreading throughout its tropical regions.

There are few data about the cultivated cacao and its varieties in Peru, where they never had the economic importance they obtained in Ecuador or Colombia. But here and there are planted the var. "criollo" with marked ridged acute pods and white cotyledons, and chiefly the "forastero" variety with smooth obtuse pods and violet cotyledons, and several intermediate forms.

After McLaughlin, Cacao Information Bulletin 2 no. 6: 3 (Turrialba, 1950), according to statistics for the year 1929, there were 11.115 hectares of cacao in Peru. Annual production at the present time is said to be 2,000 to 3,000 tons. The principal producing regions are near Jaén (Dept. Cajamarca), Huancabamba (Dept. Piura) and Valle of Convención (Dept. Cuzco); there is some production, also, in the Departments of Madre de Dios, Huánuco, San Martín, and Loreto, where there are small, scattered, cacao planta-

tions along the lowland rivers, especially near Iquitos. Herrera recorded the export of a "Cacao chuncho" from the valleys of the lower Umbamba, known to the inhabitants as "Sargemini."

T. sagittata Pavón ex Chevalier (Rev. Int. Bot. Apl. & Agr. Col. 26: 274. 1946) and *T. sinuosum* Pavón ex Huber (Bull. Herb. Boiss. sér. 2, 6: 274. 1906) are insufficiently known and have not been seen by the author; presumably they are only forms or varieties of *T. cacao* L.

Junín: La Merced, *5278*.—Loreto: Caballo-cocha in the Amazon River forest, *Williams 2105, 2349*. Alto Río Itaya, San Antonio, *Williams 3510*. Along Río Itaya, Río Mazana, *Williams 148*. Lower Río Huallaga, Recreo, Yurimaguas, *Williams 4160*. San Antonio on Río Itaya, dense forest, *Killip & Smith 29434*. Iquitos, fundo Indiana, *Y. Mexía 6399*. Balsapuerto, forest, *Klug 2938*. Mishuyacu, near Iquitos, *Klug 926*. "Cacao," "cacao sylvestre" or "común."

Theobroma calodesmis Diels, Notizbl. Bot. Gart. Berlin 14: 336. 1939.

Tree to 20 meters with glabrate branchlets; leaves coriaceous; petioles robust, tomentulose, 8–10 mm. long; blades subelliptic, acuminate, broader and asymmetric at base, entire, 2–2.5 dm. long, 8–12 cm. wide, the upper surface glabrous, pale beneath, except the glabrous nerves, covered with a whitish microscopic compressed stellate indument; midnerve and 5–6 pairs of lateral nerves very prominent beneath, the inferior subbasal pair stronger, straightly ascendant, separated 5–7 cm. from the others, which are curved-ascending; minor nerves transversal and reticulate, prominent beneath; flowers in corymbiform caulinar pedunculate clusters, 10–20 densely fasciculate, borne on pubescent slender 8–10 mm. long pedicels; sepals narrowly ovate, 8–13 mm. long, 3–4 mm. broad, reddish, whitish tomentose, pinkish within; base of the petals obovate-ellipsoid, auriculate at apex, trinervate, 4–5.5 mm. long, 3–4 mm. broad, pink-tinted, the purplish ligule subrotundate, 3.5–5.5 mm. long and broad, abruptly contracted and articulate at base; staminal tube 2 mm. long, the fertile filaments 2–3 mm. long, flexuose, bearing 2 or 3 bilocular anthers; staminodia lanceolate, purplish, 9–12 mm. long, 1.3–1.8 mm. broad at base; ovary tomentose, 2–2.5 mm. long, the style 2.5–3 mm. long with 5 nearly free branches; fruit ovoid-oblong, obtusely 5-ridged, rounded and umbilicate at base, attenuate and acuminate at apex, 10–11 cm. long, 5–5.5 cm. broad (*Fróes 20645*).

The type specimen of *T. calodesmis* (*Schultze-Rhonhof 2312*) was collected in Ecuador at Pacayacu River (local name "Chucu"), affluent of the Bobonanza near the Peru border. It is to be found undoubtedly in Peru, having been collected recently in Brazil and Colombia; Brazilian local name "cacao azul" (*Fróes*).

Peru (undoubtedly). Brazil to Ecuador and Colombia.

Theobroma grandiflorum (Spreng.) Schum. in Mart. Fl. Bras. 12, pt. 3: 76, *pl. 8*. 1886. *Bubroma grandiflorum* Spreng. in L. Syst. Veg. ed. 16. 5, pt. 3: 332. 1826. *T. macrantha* Bernoulli, l.c. 11. 1871.

Tree frequently 8–10 meters high, but may attain 18 meters; branchlets, when young, wooly ferrugineous, later glabrate, gray or brown and more or less cracked or scaled; leaves firm-coriaceous, petiolate, usually obovate-oblong or oblong, a little narrower toward the rotundate or sometimes subcordate base, rotundate and abruptly acuminate at apex, entire or slightly sinuate, usually 2–3.5 dm. to 6–11 cm. broad, the upper surface lustrous, glabrous and only the principal filiform depressed nerves conspicuous, the lower with prominent midrib and about 10 pairs of secondary nerves, these ascending and curved near the edge, prominent, the transverse tertiary nerves parallel and others less prominent forming a small reticulation; the secondary nerves pinnate but the inferior pair forming a more acute angle and more separated from the next ones; the venation glabrous, pale and dotted with scattered reddish minute warts, but the epiderm within the net covered with a dense whitish tomentum made by very tiny intricated stellate hairs; petioles 5–10 mm. long; inflorescences at the branchlets mostly axillary, with a small number of flowers (1–4); peduncles 1.5 cm. long, articulate, with 3 verticillate linear bracteoles only 2–3 mm. long, densely ferrugineous tomentose with stellate hairs; sepals 3–5, subcoriaceous, thick, ovate-triangular, about 14 mm. long, 6–8 mm. broad, within pale, reddish, thin-pubescent, without densely ferrugineous-tomentose, united at the lower part; petal-cowl (or base) suborbicular, 6–7 mm. long and broad, pubescent, strongly hooded at the apex, the ligule obcordate or elliptical-rotundate, emarginate, 6 mm. long, to 7 mm. broad, red or purple, glabrous or scarcely pilose, pediculate, the pedicel about 4 mm. long; staminal tube 1.6 mm. long, the purple membranous staminodia lanceolate, long-acuminate, about 1 cm. long, 2 mm. broad, hirtulous; fertile filament 2 mm. long, thick, curved, the anthers 3-lobate, each part bicelled; ovary tomentose, hirsute, subgolobse, the glabrous subulate style

2 mm. long; fruit ovoid-ellipsoid, smooth, to 24 cm. long, 12 cm. broad, with coriaceous hard pericarp covered with dense brown tomentum.—Planted throughout the Amazonian basin, in Brazil, Colombia, Venezuela, Peru. "Cupuassu" (Williams). The edible pulp of the fruits is used for preparation of beverages and preserves. F.M. Negs. 40706; 40705.

Loreto: Caballo-cocha on the Amazon River, *Williams 2401*.

Theobroma obovatum Klotzch in Bernoulli, Uebersicht d. Th. Arten 14. *pl. 8.* 1871.

Tree, 10–12 meters tall, with gray branchlets, the young ones tomentulose becoming glabrous; leaves petiolate, pergaminaceous, obovate-oblong or obovate-elliptic, very asymmetric and rounded or obtuse at the base, shortly attenuate-cuspidate at apex, the margin entire, almost smooth, 10–24 cm. long, 3.5–10 cm. broad, pale green and glabrous above, the venation little conspicuous, beneath pale cinereous, the midnerve very prominent, the secondary nerves 5–6 each side, prominent, ascendant, curved and subdecurrent toward the margin, the tertiary nerves transverse, very prominulous, and the minor veins slender, reticulate; the nerves beneath glabrous and marked with scattered small callous warts, the epidermic surface covered with an appressed thin tomentum composed of tiny intricate stellate hairs, the two lateral basilar nerves a little more separated and in a more acute angle than the other pairs, the nervation thus really pinnate rather than triplinerved at base; petioles 5–10 mm. long, minutely tomentulose; stipules very narrowly linear, tomentose, 3 mm. long, soon deciduous; flowers in small few-flowered axillary cymes, the slender stellate tomentose pedicels 10–15 mm. long, articulate, with 3 very small (1 mm. long) caducous bracts at the joint; buds globose, ochraceo-tomentose, 5–6 mm. in diameter; sepals ovate-oblong, acute, 6 mm. long, 3.4–4 mm. broad, united for 1 mm. at base, pale red within, ochraceous without; cowl or base of petals red, orbiculate-elliptic, 2.5 mm. long, apex rounded-cucullate, 7-nerved, glabrous, the ligule orbiculate, 3.5 mm. long and broad, emarginate at apex, little cuneate at base to a pedicel 2 mm. long, petaloid, deep red, scattered pilose; staminal tube short (1 mm.), staminodia petaloid, obovate-oblong, obtuse, 5–5.5 mm. long, 2.5 mm. broad, deep red, sparsely hirtulous, chiefly at the margin; fertile filament 1 mm. long, rather thick, curved; the anthers trimerous, each part bilocular; ovary tomentose, the style glabrous; fruit obovoid-ellipsoid, about 7 × 4 cm., with a coriaceous pericarp densely covered with acute hard warts.

Loreto: along Río Itaya, *Williams 161; 230.* Lower Río Huallaga, Puerto Arturo, Yurimaguas, *Williams 5268.* Balsapuerto, forest, *Klug 2983.* Colombian Amazonas; Brazil. From Brazil are registered as local names "cabeca de urubú" (*Ducke*), "cabeca de umbú" (*Krukoff*), "cupuarana" (*Fróes*).

Theobroma speciosum Willd. ex Spreng. in L. Syst. Veg. ed. 16. 3: 332. 1826; Bernoulli, l.c. 8. *pls. 2–3. T. quinquenervia* Bern. l.c. 8. *pls. 2–3.* 1871. *T. speciosum* var. *quinquenervium* K. Schum. in Mart. Fl. Bras. 12, pt. 3: 75. 1886.

Tree, to 15 meters tall, trunk about 2 dm. in diameter, the light gray bark smooth; branchlets brownish, more or less stellate-tomentulose; leaves firm-coriaceous, pale, short-petiolate, ovate or oblong-ovate, broadly rounded and very asymmetric at the base, more or less attenuate toward the rotundate apex, abruptly cuspidate, the margin entire and smooth, 3–4 dm. long, 14–18 cm. wide, the upper side smooth, glabrous, only the principal nerves conspicuous, the lower pale-cinereous nervation subglabrous but the surface covered with a thin very compressed tomentum of minute whitish stellate hairs; nerves usually 5, the central nerve much the stronger, 7–8 pairs of secondary pinnate nerves starting a third distant from the base, prominent, subcurved-ascending and subdecurrent at the margin, the tertiary nerves transversal, also prominent, the minor veins rather obvious, reticulate; petioles tomentulose, thick, 1–1.5 cm. long; flowers long-pedicellate in delicate panicles gathered and concentrated in many-flowered bunches borne on the trunk, these massed inflorescences (to a dm. large or longer) very showy, comprising even as many as 200 purple flowers; branchlets of the inflorescence 3–5 cm. long, very thinly and canescently stellate-tomentulose, the filiform tomentulose pedicels to 1.5 cm. long; buds rotundate, oblong, reddish, 1 cm. long; calyx of 5 ovate acute sepals 1 cm. long, 4 mm. broad, united one-third, purplish and glabrous within, reddish and covered with a pubescence of stellate hairs without; petal-base red, obovate-oblong, 6 mm. long, 3 mm. broad, the apex rotundate, 3-nerved, scarcely puberulous, shortly unguiculate, pale red with purple nerves, the ligule obovate-spathulate, rotundate or truncate at apex, cuneate at base, sessile, 6–8 mm. long, 7 mm. broad, glabrous or subglabrous, deep red and venulose; staminal tube 2 mm. long, the purple staminodia oblong-linear, long-acuminate, rather thick, densely papillose-hirtulous, 5 mm. long; fertile filaments 2 mm. long, flexuose, the anthers

trimerous, lobules 2-celled; ovary obovoid, whitish-tomentose, 2 mm. long, the glabrous 5-parted style 2 mm. long; fruit globose-ellipsoid, slightly pentagonous, about 10 × 8 cm., covered with a tenuous tomentum; pulp white, sweet, inodorous (Ducke).—F.M. Negs. 9640, 9639, 40703.

Loreto: middle Ucayali, Yarina Cocha, *Tessmann 5398*. Spread and planted throughout Amazonia chiefly in Brazil, but also in Bolivia, Ecuador, and Colombia. Brazilian names "cupuhy," "cacao azedo," "cupurana," "cacaohy," "cacao azul."

Theobroma subincanum Mart. in Buchner, Repert. der Pharm. 35: 23. 1830. *Cacao sylvestris* Aublet, Hist. Pl. Guyan. franc. 2: 687. *pl. 276*. 1775. *T. ferruginea* Bern. Neue Denksch. Schweiz. Ges. 24: 13. 1871. *T. tessmannii* Mildbr. Notizbl. Bot. Gard. Berlin 11: 139. 1931.

Tree rarely more than 15 meters tall, trunk 1.5 dm. in diameter, with a gray bark; branchlets when young appressed-tomentose, later glabrescent and rugulose; leaves firmly coriaceous, large, short-petiolate, subobovate-oblong, rotundate at base and abruptly cuspidate, the margin entire or slightly sinuate toward the apex, usually 2–11 dm. long, 7–14 cm. broad, the upper side glabrous, principal nerves very narrow and little conspicuous, the under side with a very thick and prominent midnerve and 9–12 pairs of prominent ascending parallel secondary nerves, those near the margin subdecurrent-curvate; tertiary veins transversal, prominent and reticulately united with the smaller; tomentum double: on the ground a whitish, dense, appressed tomentum formed by tiny slender entangled hairs; on the veins comprised of larger and thicker, reddish, stellate hairs; the density of this second indument is variable, but it is always present; if scattered, the color of the leaves is more ashy, as in the type; if more abundant, they cancel the ground color and make the leaf appear brownish or ferrugineous; petioles 1–1.5 cm. long; flowers axillary or at branchlets in small 1–6-flowered clusters; pedicels 4–5 mm. long, ferrugineous-tomentose, articulate at the middle with 3 filiform tomentose deciduous bractlets 3 mm. long; calyx of 5 sepals 7–8 mm. long, 3 mm. broad, one-third or half united, ovate-oblong, acute, reddish and subglabrous within, ferrugineous stellate-tomentose without; petals purple, the cowl (base) obovoid, 5–6-nerved, the apex rotundate, hooded, 3–3.5 mm. long, 2–2.5 mm. broad, puberulous; ligule obovate-spathulate, long-pedicellate, at apex truncate or emarginate, base obtuse-cuneate,

2 mm. broad, 1.5–2 mm. long, subglabrous, the margin puberulous, the pedicel thin, 2 mm. long; staminal tube about 2 mm. long, the membranaceous purple staminodia elliptic-oblong, subacute or obtuse, 7 mm. long, 2 mm. broad, scarcely pilose; fertile filaments 1–1.5 mm. long, curved, the anthers 3-lobate, lobes 2-celled; ovary obovoid, hirsute-tomentose, the acute glabrous style 2 mm. long; fruit ellipsoid or ellipsoid-oblong, about 10 × 5–6 cm., with a short thick pedicel (1 × 1 cm.), subrotundate or obtuse at both ends, the coriaceous pericarp 2–4 mm. thick, with thin appressed stellate tomentum; seeds ovoid or ovoid-oblong, more or less compressed, 22–32 mm. long, 12–16 mm. broad.—F.M. Negs 17942, 19645, 40704.

Loreto: Tierra Doble on the Río Nanay, deep forest, *Williams 1076;* Alto Río Itaya, forest of Paraiso, *Williams 3254.* Santa Ana, on the upper Río Nanay, *Williams 1233.* Mishuyacu near Iquitos, forest, *Klug 87; Klug 857.* Without definite locality, *Tessmann s. n.* (NY-3717): Brazil, Colombia. "Cacao-ceniza," "cumala," "uchpa-cacao" (Williams). In Brazil "cupuhy," "cupui."

7. GUAZUMA Plum.

Trees with unequally dentate often oblique stellate pubescent leaves and axillary shortly peduncled cymes of small flowers. Calyx 2–3-parted. Petals concave, inflexed, terminating in a linear bifid appendage. Stamens united into a campanulate tube with 5 sterile lobes and 5 stiped clusters of 4–6 anther cells. Ovary 5-celled with many ovules; styles more or less connate. Capsules subglobose, ligneous, tuberculate-echinate or setose.

Leaves firm; fruits muricate; inflorescence congested . . *G. ulmifolia.*
Leaves membranous; fruits densely long-setulose; inflorescence open . . . . . *G. crinita.*

Guazuma crinita Mart. Flora 20, pt. 2: Beibl. 95. 1837. *G. rosea* Poeppig in Poepp. & Endl. Nov. Gen. & Sp. 3: 72. 1845.

Tall tree with usually subcordate ovate leaves much exceeded by the copiously flowered tomentulose panicles of rose-tinted blossoms, most of them sterile; branchlets erect, terete, deciduously tomentulose; petioles to 12 mm. long; leaves obtuse, unequally serrate, basally 5-nerved, tomentose beneath, minutely and sparsely stellulate above, membranous, to 1 dm. long, half as wide; peduncles about half as long, the unequal pedicels corymbose or cymose; calyx 3-parted, the segments broadly ovate; petals cucullate, api-

cally 3-dentate, the ligule deeply biparted; anthers in 3's; ovules numerous; capsules ovate, acute, ligneous, hirsute.—After Poeppig. To over 30 meters tall with rather tall buttresses, the wood used for sugar boxes and crates according to Williams, who gives anatomical descriptions (also for *G. ulmifolia*), Field Mus. Bot. 15: 319. 1936. Illustrated, Poeppig & Endlicher, l.c. *pl. 283*. F.M. Neg. 9637.

San Martín: Tarapoto, *Williams 5698*. Chazuta, *Klug 4059*. —Loreto: Yurimaguas, *Poeppig* (type, *G. rosea*); *Williams 4221; 5015*. Pongo de Manseriche, *Mexia 6126*. Balsapuerto, *Klug 2971*. Lower Río Nanay, *Williams 434*. Río Itaya, *Williams 151*. Brazil. "Atadija" (Poeppig), "bolaina" (Poeppig).

Guazuma ulmifolia Lam. Encycl. 3: 52. 1789. *G. utilis* Poeppig in Poepp. & Endl. Nov. Gen. & Sp. 3: 72. 1845, fide Freytag. *G. tomentosa* HBK. Nov. Gen. & Sp. 5: 320. 1823.

Tree, sometimes 30 meters tall, with long branchlets densely stellate toward the tip, oblong or oblong-ovate acuminate 3-nerved serrulate sparsely stellate leaves (both sides or canescent beneath), short cymes (about as long as petioles) of yellowish flowers; petioles short or to 2.5 cm. long; leaves to 1.5 dm. long, 5 cm. wide, obtusely acute and oblique at base; peduncles bifid; calyx ferrugineous tomentose, the segments subrotund; fruits subglobose, 2–4 cm. thick, densely roughened with short sharp tubercles, the many large hard seeds surrounded by a little edible sweet pulp.—After Poeppig. Leaves densely tomentose in the var. *tomentella* Schum. in Mart. Fl. Bras. 12, pt. 3: 81. 1886, apparently *G. tomentosa* HBK. Sometimes 30 meters tall, and common in the Middle and Lower Huallaga regions (Williams); the inner laminated bark furnishes a fiber used for cordage. See Standley & Steyermark, Fl. of Guatemala (Fieldiana: Bot. 24, pt. 6: 411–412. 1949), who list a truly remarkable number of past or present attributes of this species in Central America, including its food interest to bees, cattle, silk-worms and children! Illustrated, Fawcett & Rendle, Fl. Jam. 5: 157, *fig. 59*. F.M. Negs. 9638 (*G. utilis*); 35346.

Cajamarca: Río Chotano Valley, *Weberbauer 7116* (var.); *Raimondi*.—Lambayeque: Olmos, *Weberbauer 7092* (var.).—San Martín: Tarapoto, *Ule 6434; Williams 5675*.—Junín: La Merced, *Weberbauer 1945; 6271* (var.).—Loreto: Yurimaguas, *Poeppig* (type, *G. utilis*); *Williams 4227; 4768* (det. Standley). Balsapuerto, *Klug 2939* (det. Standley). Florida, *Klug 1995; 2018* (det. Standley). Río Paranapura, *Klug 3952* (det. Freytag; det. Standley, *G. crinita*). Puerto

Meléndez, *Tessmann 4740.* Yarina Cocha, *Tessmann 3462.* To the West Indies; Mexico. "Huashimo" (Raimondi), "hapayillo," "lluicho-vanilla" (Williams), "iumanasi," "huásimo" or "huásim" (Weberbauer).

8. HELICTERES L.

Shrubs with stellate or branched pubescence, entire or serrate leaves, and usually zygomorphic axillary flowers, solitary or in clusters. Calyx tubular, 5-parted, often irregular. Petals 5, unguiculate, some or all frequently auriculate. Gynophore early strongly curved, elongate, with 6–many slightly connate stamens, the anthers linear. Ovary 5-lobed, 5-celled; styles 5, subulate. Fruit composed of 5 ligneous commonly spirally twisted follicles with many verruculose seeds.—R. E. Fries, Sv. Vet. Akad. Handl. ser. 2. 42, no. 12: 21–22. 1908, gave a key to the actinomorphic flowered species.

Leaves subsessile in a plane; petals included.....*H. pentandra.*
Leaves distinctly petioled; petals exserted.....*H. ovata.*

Helicteres ovata Lam. Encycl. 3: 88. 1789.

Fulvous stellate-tomentose including the calyces, or the leaves in age greenish and more or less glabrate above; petioles 1–2 cm. long, the caducous filiform stipules about as long; leaves broadly ovate, acute or acuminate, often about 12 cm. long and more than half as wide, unequally serrate; dichasia opposite the leaves or subaxillary; calyx one third parted, about 2 cm. long, bilabiate, 3–5-lobate, subfloccose-tomentose, the spathulate red petals 23–27 mm. long, the processes near the base lacerate-dentate; gynophore 7–9 cm. long; fruit 4 cm. long, 1.5–2 cm. in diameter, finally glabrescent.—The Peruvian specimen was distributed as a new species by Standley under the name of the country; the one flower has coarser indument than described in Schumann's key to the species of Brazil but matches closely some material so determined. Illustrated, Mart. Fl. Bras. 12, pt. 3: *pl. 5.* F.M. Neg. 35375.

San Martín: Juanjuí, *Klug 4265.* To Paraguay.

Helicteres pentandra L. Mant. 2: 294. 1771.

Strict shrub or little tree sometimes a few meters tall, with widely spreading virgate rather coarsely stellate pubescent branches, especially in the leafless lower part, closely leafy above, and sub-

regular flowers borne on small branchlets (dichasia) in their upper leaf-axils, the subsessile ovate-oblong leaves disposed in a plane, subcordate at base, acute, mostly about 1 dm. long, at least half as wide, doubly serrulate, green, rugulose and scabrous-stellate above, canescent-stellate beneath; bracts lanceolate, caducous; peduncles 4–5, pedicels 3–4 mm. long; calyx clavate-tubular, hirsute-tomentose, about 2 cm. long, early yellowish becoming roseate, slightly longer than the linear-spathulate white or roseate petals; gynophore to 4 cm. long; fruits 2–2.5 cm. long, 1 cm. in diameter, densely hirsute. —Actually with 6 stamens, the only actinomorphic species with this number. Grows on open sandy plains. Illustrated, Mart. Fl. Bras. 12, pt. 3: *pl. 3*.

San Martín: Tarapoto, *Woytkowski 35035; Williams 3407; 5904*. In clearing, Juanjuí, *Klug 4205* (det. Standley).—Junín: La Merced, *5299; 5486*. Río Perené, *Killip & Smith 24969; 25111*.—Amazonas: Moyobamba, *Mathews 1547* (det. Hochreutiner). To the Guianas. "Tornecillo" (Williams).

9. STERCULIA L.

Trees with simple or lobed leaves and unisexual or polygamous flowers borne in axillary or terminal racemes or panicles. Calyx 5-cleft, usually colored. Petals none. Staminal tube with 10 or 15 anthers crowded apically. Carpels of the ovary 5, nearly free, 2–many ovuled, the styles peltate or lobed, the mature carpels distinct, tardily dehiscent introrsely. Seeds 1–many, the endosperm fleshy.—Flowers variable in size, and normally simple leaved species may have lobed leaves on vegetative shoots (Ducke, Archiv. Jard. Bot. Rio. Jan. 3: 213. 1922). Besides the following, *S. roseiflora* Ducke, Archiv. Inst. Biol. Veg. Rio Jan. 2: 58. 1935, from as near as São Paulo de Olivença may occur within Amazonian Peru and perhaps is unique in its rose-colored flowers. This is yet another genus without a modern revision, and ex char. at least, many proposed species are incompletely known.

Leaves of flowering branchlets simple.

Mature leaves covered beneath with a minute close indument. *S. solitudinis*.

Mature leaves glabrous, glabrate or more or less loosely stellate pubescent beneath.

Leaves quite glabrous at least in age, equally reticulate veined both sides ..... *S. glabrifolia*.

Leaves at least slightly pubescent in the nerve axils or on the nerves beneath in age.

Leaves smooth beneath, or reticulate, often about 2 dm. long; fruits (known) about 4 cm. long. *S. Tessmannii; S. pruriens.*

Leaves rugose-nerved, often ample; fruits about 1 dm. long. *S. speciosa.*

Leaves of flowering branches 3–5-lobed, cordate. . . . . *S. apetala.*

Sterculia apetala (Jacq.) Karst. Fl. Columb. 2: 35. *pl. 118.* 1869. *Helicteres apetala* Jacq. Enum. Pl. Carib. 30. 1760.

Tree sometimes attaining 30 meters and developing a tall straight trunk, the densely leafy crown depressed and spreading; petioles to 2 dm. long, as the leaves beneath early more or less tomentose but at least in Peru promptly glabrate, the stellate trichomes scattered and inconspicuous unless on the nerves and veins; leaves often 3 dm. broad, deeply 3–5-lobed, the broad lobes rounded-obtuse or acutish; panicles often equaling the petioles, apparently crowded typically; calyx campanulate, about 2.5 cm. wide at the flaring top, 1.5–2 cm. long, yellowish with purple dots and lines; fruiting carpels tomentulose without, hispid within, usually about a dm. long with 2–4 large black ellipsoid seeds.—Determinations by Standley. *S. elata* Ducke, Archiv. Jard. Bot. Rio. Jan. 3: 211. 1922, may be, possibly, the Peruvian tree; it was separated by the author from *S. Chicha* St. Hil. of Goyaz, Brazil, which according to Schumann differs in size of fruits and leaf-texture, while *S. elata* has gynophore about one half instead of one third as long as calyx; the characters appear to be relative.

San Martín: Juanjuí, *Klug 4262.*—Huánuco: Monzón, *Weberbauer 3652* (det. Ulbrich, *S. Chicha*). Tingo María, *Burgos 34.*—Loreto: Mishuyacu, *Klug 2529.* Puerto Meléndez, *Tessmann 3913* (det. Ulbrich, *S. Chicha*).—Río Acre: Mouth Río Macauhán, *Krukoff 5471* (distr. as *S. elata* Ducke?). To Mexico and the West Indies. "Sahote," "husyracaspi."

Sterculia glabrifolia Mildbr. Notizbl. Bot. Gart. Berlin 9: 1148. 1927.

Glabrous except for a stellulate puberulent indument in the inflorescence; petioles 4–8 cm. long; leaves coriaceous, oval or obovate-oval, rounded-obtuse at base, abruptly short-acuminate, 10–24, mostly about 17 cm. long, 4.5–13, mostly 8–10 cm. wide, with

8–10 lateral nerves, the reticulate veins equally manifest both sides; flowers small, the sepals connate about 1.5 mm., the free portion 5 mm. long; fruit unknown.—Similar to *S. frondosa* Rich. but differs in the entire absence of pubescence on the leaves and in the evident and fine reticulation (Mildbraed); and *S. frondosa* at least as to type has slightly retuse leaves. However any difference with *S. pruriens* seems vague. F.M. Neg. 9623.

Loreto: Mouth of the Santiago, *Tessmann 4041*, type.

Sterculia pruriens (Aubl.) Schum. in Mart. Fl. Bras. 12, pt. 3: 8. 1886. *Ivira pruriens* Aubl. Pl. Guian. 2: 695. *pl. 279.* 1775.

Branchlets, petioles, these to 1 dm. long, and inflorescence reddish-rusty tomentulose; leaves early pubescent above, tomentose beneath, at maturity glabrate, subcoriaceous, oblongish, often 1.5–2.5 dm. long, 6–10 cm. wide, rounded or slightly or obscurely cordate at base, distinctly but shortly acuminate at apex; calyx 12 mm. long; carpels rostrate, 4 cm. long, 3.5 cm. thick, borne on a gynophore 2 cm. long.—Attains 40 meters (Krukoff). *S. pilosa* Ducke, Archiv. Jard. Bot. Rio Jan. 3: 212. 1922, is rather similar but seems to be well marked by its very long and abundant pilosity and perhaps is rather allied to *S. speciosa* as the leaves are coarsely bullate-rugose and lustrous above, the flowers pale reddish. *S. apeibophylla* Ducke, Bol. Técn. Agron. Norte, Belém 4: 16. 1945, to be expected, is similar according to the author but the opaque leaves are smoother above, petals deep red, malodorous and the fruits large as in *S. speciosa.*

Río Acre: Mouth Río Macauhán, *Krukoff 5421; 5634* (det. N. Y. Bot. Gard.). To the Guianas.

Sterculia solitudinis Mildbr. Notizbl. Bot. Gart. Berlin 11: 138. 1931.

Type a sparsely branched tree 30 meters tall with trunk 9 dm. in diameter, the specimen branch 12 mm. thick with glabrate rugulose bark; petioles 6 or 7 cm. long; leaves ovate, little cordate at base, subacute, about 2 dm. long, 14–18 cm. wide (or upper 9 × 12 cm.), finally coriaceous, glabrous and the 7 primary veins scarcely prominent above, beneath with the veins conspicuously reticulate and compactly stellate-tomentose with dark ferrugineous indument; panicle apparently few-branched, about 8 cm. long, tomentulose-puberulent, including the stellately spreading male flowers, their sepals 2 mm. connate, 7 mm. free, acuminate from the 2 mm. wide

base with a tiny transverse callus within on the upper third, and toward the base fasciculately long-pubescent; basally enlarged 10-anthered androgynophore 5 mm. long; cupulate stamen tube glabrous as the rudimentary pistils.—Leaves densely red-rusty stellate beneath in youth, later glabrate, rugose-reticulate; seems too near the Colombian *S. rugosa* R. Br. but the author wrote: easily recognizable by the dense reticulation of the leaves beneath and the short red-brown felt that covers them so closely that a ten power lens scarcely defines the stellate trichomes individually. F.M. Neg. 17943.

Loreto: Río Itaya, *Tessmann 5190*, type.

Sterculia speciosa Schum. in Mart. Fl. Bras. 12, pt. 3: 7. 1886.

Similar, apparently, to *S. pruriens*, but, according to Ducke, the sterile branches at least with very large leaves often with a rounded lateral lobe, fruits 12 × 10 cm. and flowers very malodorous; petioles to 8 cm. long (probably longer); leaves oblong, obtuse, emarginate and mucronate, rounded at base, those of flowering branches 2–2.5 dm. long, 9–14 cm. wide, rugose and glabrescent beneath, puberulent in the axils; calyx variable in size, usually more than 15 mm. long, the lanceolate acuminate segments tomentose both sides; gynophore filiform, 8–9 mm. long, glandular-tomentose only at base, less than half as long as the calyx; stamen tube cupulate; fruits large (Ducke) with 10 ellipsoid seeds (Martius).—Illustrated, Schumann, l.c. *pl. 1.*

Peru (probably). Upper Amazonian Brazil.

Sterculia Tessmannii Mildbr. Notizbl. Bot. Gart. Berlin 9: 1149. 1927.

Branchlet tips densely puberulent; petioles 4–11 cm. long; leaves coriaceous, ovate-oval, rounded or obscurely cordulate, subabruptly acuminate (acumen sometimes 2 cm. long), 1–2.5 dm. long, 6–14 cm. wide, glabrous above, sparsely stellate pubescent beneath, lateral nerves about 8 and with transverse veins prominent beneath, reticulation obvious above, obsolete beneath; calyx 9 mm. high, connate about 1.5 mm.; otherwise no distinctions with related species noted.—Type from a tree 18 meters high and according to the author distinguished from *S. pruriens* by the much less dense pubescence on the under surface of the leaves and the prominent lateral and secondary venation beneath, apparently intangible characters. *Williams 2570* from La Victoria at the boundary and referred here by me with query in herb. is doubtfully a *Sterculia;* the specimen seen has only young buds. F.M. Neg. 9626.

Loreto: Flood-free woods at mouth of the Río Apaga below Pongo de Manseriche, *Tessmann 3847*, type. Mishuyacu near Iquitos, *Klug 2525; 2512?* (this with larger flowers proposed in herb. by Standley as undescribed).

DILLENIACEAE

References: Eichler, Fl. Bras. 13, pt. 1: 65–120. 1863; Lanjouw & Van Heerdt, in Pulle, Fl. Surinam 3: 386–408. 1941.

Trees or shrubs, sometimes scandent, rarely herbs, the alternate simple leaves usually with harsh pubescence and with many parallel lateral nerves. Stipules if present alate and adnate to petiole, mostly deciduous. Flowers variously disposed, hermaphrodite, with 5 (rarely fewer or more) imbricate sepals and petals, the former persisting and frequently accrescent, the latter early deciduous and often crinkled in bud. Stamens usually many, free or variously connate at base; anthers dehiscent apically or longitudinally. Gynoecium usually of several distinct pistils, ovary superior, 1-celled and -carpelled, placentation parallel, sometimes appearing basal, ovules 1 or more, each with 2 integuments, erect, the styles as many as pistils, distinct. Fruit a follicle or berry-like, seeds with copious endosperm, embryo minute and usually somewhat lacerated.

The types of the several species I have proposed in this family were not available in the preparation of this final draft and consequently their status, which I doubt now, has not been reviewed.

Sepals unequal in flower, the larger inner valvate and enclosing racemose or paniculate fruits ..... 1. *Davilla.*

Sepals nearly or quite alike, not accrescent.

Inflorescences usually solitary, terminal; aril lacerate. 2. *Tetracera.*

Inflorescences axillary or at leaf-scars, rarely in part terminal.

Flowers usually in axillary fascicles; carpels often 1; fruit a berry or capsule ..... 3. *Doliocarpus.*

Flowers in softly pubescent clusters at leaf-scars; carpels 2; fruit a follicle ..... 4. *Curatella.*

1. DAVILLA Vand.

Commonly lianas with entire or dentate estipulate leaves, the trichomes always simple, and mostly terminal racemes or panicles

of yellow flowers, or these axillary and reduced, sometimes greatly. Sepals 5, the inner 2 much the larger, concave, after anthesis indurate. Petals 5 (1–6). Stamens many, the filaments thickened apically, the cells of the globose anthers divaricate basally. Carpels 1–2 (3), 2-ovuled, the terminal style persisting, at maturity indehiscent or regularly dehiscent, the 1–2 follicles within the persisting stamens and the 2 inner sepals. Seeds black, lustrous, nearly enclosed by the aril.

Branchlets glabrate to hirsute, not villous-tomentose.
  Glabrate or glabrous even to inflorescence, the leaves smooth above.....*D. multiflora.*
  Pubescent, or at least leaves asperous above.
    Leaves coarsely reticulate-veined beneath.....*D. aspera.*
    Leaves finely veined beneath.....*D. rugosa.*
Branchlets rusty villous-tomentose.....*D. densa.*

Davilla aspera (Aubl.) Benoist, Bull. Soc. Bot. Fr. 60. 392. 1913. *Tigarea aspera* Aubl. Pl. Guian. 2: 918. *pl. 350.* 1775. *D. lucida* Presl, Rel. Haenk. 2: 73. 1835. *Tetracera Tigarea* DC. Syst. Veg. 1: 403. 1818.

Harshly asperous liana, especially the more or less elliptical leaves above, these notably reticulate beneath by many veins that are not at all or scarcely visible on the upper surface; lateral nerves as sometimes tertiary impressed above, 8–24, prominent and usually appressed hirsute beneath; petioles narrowly alate by the abruptly decurrent leaf-blades, these sometimes abruptly and acutely apiculate, sometimes rounded and quite obtuse, variable in size as in shape but usually about twice longer than wide, the larger about 1.5 dm. long, entire to minutely and remotely denticulate; panicles upper-axillary and terminal sometimes hirsute but trichomes ascending, usually merely asperous or glabrescent, several cm. to rarely 1.5 dm. long and wide; pedicels slender, 3–7 (10) mm. long; petals 3–4 mm. long, yellow, cucullate; outer sepals nearly minute, the deeply concave imbricate inner 2 indurating and developing with the enclosed fruit, this 5 mm. in diameter.—Compare *D. rugosa,* to which Standley referred all the Peruvian specimens, perhaps correctly. Illustrated, Mart. Fl. Bras. 13, pt. 1: *pl. 27.* F.M. Negs. 9487; 23906 (*D. lucida*); 38710.

Junín: Brushy river bluff, *5399* (det. Killip). Puerto Yessup, *Killip & Smith 26337; 26273.*—Loreto: Iquitos, *Killip & Smith*

26956; Williams 1488; 1403; 3570; Klug 112. To the Guianas and Central America.

Davilla densa Macbr. Candollea 6: 15. 1934.

Liana or perhaps only the elongate branches scandent, the branchlets, petioles (1.5–2 cm. long), leaves beneath and the extremely compact inflorescences densely brownish villous unless in age; leaves entire or most obscurely and remotely denticulate, drying rigid-chartaceous, shortly asperulous-hirsutulous above, the midnerve densely hirsute, nearly elliptic, more or less rounded and abruptly alate-decurrent at base, acute or shortly acuminate, mostly 8 cm. long, 5 cm. wide, sometimes nearly 2 dm. long and half as wide; pedicels numerous, 2–4 mm. long; sepals chartaceous, brownish pilose, developing with the enclosed globose fruit, the whole scarcely 5 mm. thick, glabrous and lustrous within.—Except for the extraordinary density of the inflorescence, apparently smaller flowers and perhaps its more nearly entire leaves it is similar to *D. rugosa* Poir. to which possibly it could be referred, at most as a variety but not seen since publication, maybe not this genus.

Loreto: Yurimaguas, *Williams 3826*, type; *Killip & Smith 27548.*

Davilla multiflora (DC.) St. Hil. Pl. Usu. no. 22: 5. 1825. *Tetracera multiflora* DC. Syst. Veg. 1: 400. 1818.

Glabrous and smooth or the exfoliating branches slightly asperous and the ovate to elliptic usually rounded entire lustrous leaves and many-flowered inflorescences sometimes slightly pilose, the former usually on the 7–16 prominent lateral nerves beneath; veins more or less conspicuous both sides; panicles ample, much-branched, the apically enlarged pedicels 8–10 mm. long; outer sepals 2–2.5 mm. long, the lustrous inner 6 or 7 mm. long and broad, exceeded by the entire petals.—Actually reported as noted below from adjacent Brazil and also on the Upper Amazon but perhaps not typical. Illustrated, Delessert, Icon. Select. 1: 69.

Río Acre: *Ule 9611* (det. Mansfeld). Río Macauhán, *Krukoff 5359?* Brazil.

Davilla rugosa Poir. Encycl. Suppl. 2: 457. 1812. *D. brasiliana* DC. Syst. Veg. 1: 405. 1818.

Typically distinct from *D. aspera* by the much finer veins, these not rugosely reticulate beneath but usually obvious above, and also by the hirsute spreading pubescence of the younger branches,

petioles, leaf-nerves and panicles, but in Peru this indument little obvious or lacking; also the slender but prominent lateral nerves terminate more frequently into a spinulose cusp especially toward the acute or acutish tips or the cusp may be from a vein as the nerves often anastomose before the margin; fruit said to attain 8 mm. in diameter.—The characters in some specimens seem to be intangible or possibly the glabrate Peruvian plant is distinct, at least as a variant. Probably (ex char.) *D. Lechleri* Rusby, Mem. Torrey Club 6: 2. 1896, type from Bolivia but said by author to be the same as *Lechler 2316* from Peru (probably from Puno, not seen), belongs here. Determinations by Standley.

San Martín: Juanjuí, *Klug 4322*. Chazuta, *Klug 4056*. Tarapoto, *Williams 5634; 6404*.—Junín: Puerto Bermudez, *Killip & Smith 26526*.—Loreto: Yurimaguas, *Williams 4008; 4808*. Central and northern South America.

2. TETRACERA L.

Lianas, rarely trees, the leaves more or less roughened by a stellate silicified indument. Flowers sometimes polygamous, rarely dioecious, mostly in terminal often lax racemes. Sepals equal or unequal, not accrescent, typically about 5 but sometimes many. Anthers extrorse, the cells more or less divaricate. Carpels solitary or usually 3–5, free, each with several ovules in 2–3 series. Fruits often radially disposed, follicular, the aril of the 1–4 seeds lacerately extended above the seed.

Sepals glabrous within; carpel 1 ..... *T. parviflora*.
Sepals sericeous within; carpels 5 ..... *T. Williamsii*.

Tetracera parviflora (Rusby) Sleumer, Repert. Sp. Nov. 39: 47. 1935. *T. aspera* (Aubl.) Willd. var. *boliviana* and var. *peruviana* O. Ktze. Rev. Gen. 3, pt. 2: 2. 1898. *Davilla parviflora* Rusby, Mem. Torrey Club 6: 3. 1896.

Verruculose-asperous, the older bark exfoliating; petioles 5–10 mm. long, margined; leaves oval to oblong-obovate, abruptly contracted at base, 6–12 cm. long, half as wide, entire to mucronately sinuate-serrate especially toward the rounded or shortly and obtusely acute tip, coriaceous, the 13–16 lateral nerves parallel and acutely prominent beneath as the reticulate veins; panicles about 4 cm. long, lax; bracts oblong, canescent, 1 mm. long; pedicels angled, short; buds globose, 2.5 mm. in diameter; sepals minutely

stellate-puberulent-scabrous without, glabrous within, about equaled by the white petals; carpel solitary.—Apparently this could be interpreted as a variant of *T. aspera*, as indicated by Kuntze. F.M. Neg. 15497 (var. *peruviana*).

San Martín: Juan Guerra, *Williams 6896* (det. Sleumer). Tocache, *Poeppig.*—Junín: In canyon thicket, La Merced, *5489.* Río Perené, *Killip & Smith 25019; 25033.*—Ayacucho: Estrella, *Killip & Smith* 22676 (det. Killip). Bolivia; Brazil.

Tetracera Williamsii Macbr. Candollea 6: 14. 1934.

Liana, the slender flexuose minutely scabrous branches much exfoliating in papyraceous sheets; leaves elliptic or oblong-elliptic, rounded-cuneate at base and decurrent into the 1 cm. long petiole, abruptly caudate-acuminate, 12 cm. long, 6 cm. wide, sometimes to 17 cm. long, coarsely undulate dentate, chartaceous, scabrous both sides and above especially on the midnerve, sparsely hirsutulous underneath, conspicuously appressed asperous on the 14 nerves; inflorescence moderately paniculate, the branchlets remotely 3–7-flowered, somewhat hirsutulous, with stellate and scabrous trichomes intermixed; flowers about 8 mm. long, the broadly elliptic sepals 5 mm. long, glabrous or slightly asperulous without, densely sericeous villous within; petals obovate, minutely crenulate apically, 6 mm. long; filaments 3 mm. long, barely connate at base and long hirsute; carpels 5, attenuate into the glabrous styles.—Apparently related to *T. Breyniana* Schlecht. because of character of sepals but the leaves strongly serrate, a not impressive character unless there are substantiating ones; cf. also *T. volubilis* L., sepals pubescent both sides, but not seen in the preparation of this account. However, voidance of the sepal character would destroy the traditional classification, which may be, of course, incorrect.

Loreto: Río Itaya, *Williams 54*, type; also Río Mazán, *8126; José Schunke 168* (det. Standley, *T. volubilis*). "Paujilchaqui."

3. DOLIOCARPUS Rolander

Lianas or less frequently not scandent, rarely tree-like, the coriaceous leaves estipulate, the indument simple, the flowers usually in axillary umbelliform fascicles, rarely solitary. Sepals 5 (3–6), spreading, often unequal. Petals usually 3–4 (2–6). Filaments dilated apically, the small anthers extrorse, dehiscing longitudinally. Carpels 1 (2), 2 (1) -ovuled. Fruit baccate, dehiscing

irregularly if at all or sometimes capsular, the seeds enclosed by the membranous or fleshy aril.—The always extrorse anthers are often used as a key character in contrast to those of *Curatella*. Several of the species proposed recently seem to be based on characters of questionable significance.

Flowers solitary or in fascicles of 2–6 or so; ovary villous or hirtellous except *D. amazonicus*.

Leaves acutely acuminate.

Flowers about 1 cm. long or longer; pedicels often longer than 3 mm.

Flowers to 1 cm. long; leaves medium.....*D. Rolandri*.

Flowers about 2 cm. long; leaves ample.....*D. magnificus*.

Flowers about 5 mm. long; pedicels 3 mm. long.

Leaves ample, to 1 dm. wide.....*D. amazonicus*.

Leaves about 4.5 cm. wide.....*D. curtipes*.

Leaves obtuse or obtusely short acuminate.

Flowers 2–4, about 5 mm. long.....*D. aptus*.

Flowers solitary, about 1.5 cm. long.....*D. pulcher*.

Flowers in most fascicles 12–30 or more; ovary glabrous.

Leaves acutely acuminate, ovate-elliptic.....*D. dentatus*.

Leaves shortly or scarcely acute, oblong-elliptic....*D. densiflorus*.

Doliocarpus amazonicus Sleumer, Repert. Sp. Nov. 39: 44. 1935.

Nearly glabrous shrub with subterete branchlets, ample lanceolate-oblong leaves and small very shortly pedicellate 3–6-fasciculate flowers; petioles more or less hirsutulous, about 6 mm. long; leaves attenuate to the subrotund or subtruncate base, acuminate, 1.5– nearly 2.5 dm. long, 6– about 10 cm. wide, coarsely but irregularly serrate (serrations about 2 mm. high, 1.5–2 cm. distant) or undulate, chartaceous, type in herb. violet-brown above, suffused with reddish-brown beneath, opaque, not all rugose, the 13–15 lateral nerves little impressed above, conspicuous and pilosiusculous beneath, the subparallel veins rather prominent; pedicels scarcely 3 mm. long; sepals ovate, about 4.5 mm. long, 2.5 mm. wide, sparsely but distinctly puberulent without, nearly glabrous within, the glabrous obovate petals little longer; ovary ovoid, glabrous, stigma peltate. —Type a shrub with trunk diameter of 1 dm.; differs from *D. undulatus* Eichler in the larger leaves and shorter pedicels (author).

Loreto: Mouth of the Capanahua, Río Blanco, *Tessmann 3065*, type. Florida, *Klug 2054?*

Doliocarpus aptus Macbr. Candollea 6: 13. 1934.

Scandent, the terete branches glabrous, the short branchlets puberulous; petioles typically about 2.5 cm. long; leaves elliptic-obovate, broadly cuneate-acute at base, obtusely short-acuminate or subobtuse, mostly about 1 dm. long, 6–7 cm. wide or smaller, sometimes 1.5 dm. long, 8 cm. wide, entire, coriaceous, scarcely lustrous, glabrous above, sparsely pilose-puberulent beneath (as the petioles) with short and longer trichomes intermixed, the 12 or so lateral nerves with the more or less reticulate veins prominent beneath, scarcely visible above; pedicels 2–4-fasciculate, 2–2.5 mm. long; petals greenish white, suboblong, 5 mm. long, pulverulent without, glabrous within; filaments to 7 mm. long, little flexuose; ovary as style densely brownish pilose, the stigma capitate-peltate. —Var. *curtus* Macbr. l.c. is striking by the short (5–10 mm. long) petioles, leaves mostly 7 cm. long, about 5 cm. wide, pedicels scarcely 2 mm. long. The liana is evidently comparable to *D. dentosus* Mart. (*D. major* Gmelin, fide Lanjouw) from which it differs notably in its entire not at all acuminate leaves, pubescent beneath, shorter pedicels and pubescent style, the indument of the ovary much longer, but not seen in preparation of this final compilation.

Loreto: Mishuyacu near Iquitos, *Klug 977*, type; *714* (type, var.).

Doliocarpus curtipes Macbr. Candollea 6: 13. 1934.

Scandent, the branches sparsely pilose-hirsutulous; petioles 3–4 mm. long; leaves ovate-elliptic, acute at base, remotely and coarsely mucronate-serrate toward the acuminate tip, mostly 1 dm. long, 4.5 cm. wide, membranous, minutely and sparsely lepidote both sides, slightly pilose beneath on the nerves; flowers 1–4-fasciculate in the axils, 5–6 mm. wide; pedicels 3 mm. long, densely short-villous; sepals both sides, especially without, lightly sericeous, the white petals densely so at base within, 5 mm. long, about equaled by the filaments, the anthers oblong; ovary shortly villous, the style glabrous.—Related to *D. dentosus* Mart. (*D. major* Gmelin, fide Lanjouw) but pedicels much shorter, leaves definitely pubescent; therefore, lacking any marked characteristic it could be treated as a variant; however, not seen since publication.

Loreto: Mishuyacu near Iquitos, *Williams 771*, type.

Doliocarpus densiflorus (Eichler) Steyerm. Fieldiana: Bot. 28: 367. 1952. *D. brevipedicellatus* Garcke var. *densiflorus* Eichler in Mart. Fl. Bras. 13, pt. 1: 81. 1863.

Probably a shrub, glabrescent, the densely leafy flowering branchlets nearly to tips almost filled continuously from node to node with the compact fascicled numerous small flowers; indument deciduous, early long-pilose on the stout canaliculate petioles, these almost 1 cm. long, and leaf midnerve and 12 or so prominent lateral nerves beneath; leaves ovate- or oblong-elliptic, shortly acute or acutish, mostly 8–12 cm. long, about 4 cm. wide, coarsely and remotely repand-serrate except toward base, slightly lustrous and obviously veiny both sides, coriaceous, drying dark but paler beneath; pedicels laxly puberulent-pilose, about 7 mm. long; sepals medially puberulent, membranous in flower, the larger about 4 mm. long and wide, little exceeded by the petals; filaments suberect in bud, anthers ovoid; fruit unknown.—Gleason, Bull. Torrey Club 58: 388. 1931, avoided citing place of publication of species name in giving Sprague & Williams as authority for above transfer and therefore did not make it for them as indicated in Gray Herb. Index. Actually both the author who published it and I had also used it in herbaria.

San Martín: Tarapoto, *Spruce 4567*, type; *Klug 1551*. To Venezuela and Guiana.

Doliocarpus dentatus (Aubl.) Standley, Journ. Wash. Acad. Sci. 15: 286. 1925. *Tigarea dentata* Aubl. Pl. Guian. 2: 290. *pl. 351.* 1775. *D. Rolandri* in lit. not Gmelin, fide Sandwith. *D. brevipedicellatus* Garcke in Linnaea 22: 47. 1849?

Shrub-tree or the few slender branches scandent, slightly sericeous at the growing tips as the petioles (1–2.5 cm. long) and leaves, or these more or less continuously appressed pilose above, and especially on the 10–18 prominent lateral nerves beneath, ovate-elliptic or somewhat obovate, narrowed or acute at base, acutely acuminate, mostly 1–1.5 dm. long, about half as wide, chartaceous-coriaceous, slightly serrate above the middle, the nerves obscure above; flowers usually 15–30-fascicled, the slender pedicels 6–10 mm. long or longer, puberulent as the 4 or 5 oblong to suborbicular, obtuse sepals, these to 5 mm. long or about as long as the 2 or 3 obovate unguiculate petals; filaments early suberect, anthers short; carpel subglobose, glabrous, style about 1 mm. long; berry 6–7 mm. in diameter, reddish, the 1 or 2 seeds lustrous,

fuscous.—The numerous small flowers and the glabrous carpels suggest that Garcke's species, if not distinct, is a part of *D. dentatus* rather than *D. Rolandri*.

San Martín: Zepelacio, *Klug 3748* (det. Standley).—Huánuco: Monzón, *Weberbauer 3490*.—Junín: La Merced, *5578* (det. Sprague).—Loreto: On the Ucayali, *Tessmann 3449*. Río Nanay, *Williams 975; 1210*. To Central America and the West Indies.

Doliocarpus magnificus Sleumer, Repert. Sp. Nov. 39: 45. 1935.

Beautiful liana with ample smooth foliage and large solitary or few-fasciculate whitish flowers, the obovate petals to 2 cm. long and half as wide; petioles obviously canaliculate, about 1 cm. long, 2 mm. thick; leaves coarsely and irregularly undulate-serrate or merely -mucronulate, obovate-oblong, long-cuneate to base, acutely acuminate (acumen to 2 cm. long), 8–11 cm. wide or wider, 2.5–3.5 dm. long, chartaceous, not at all rugose, minutely lepidulose beneath (nearly soft to touch), the 17 or so prominent (beneath) lateral nerves pilose-puberulent both sides, the vein-reticulation beneath notably elevated; pedicels about 3 mm. long, 1.5 mm. thick; sepals orbicular-obovate, densely appressed sericeous both sides, 12 mm. long, 7 mm. wide; filaments nearly 1 cm. long; ovary conical, densely yellowish sericeous.—Allied to *D. grandiflorus* Eichl. (sect. *Othlis*) but exceptional in size of leaves and flowers. Probably will be found in adjacent Peru.

Río Acre: Seringal Auristella, *Ule 9610*, type. Bolivia.

Doliocarpus pulcher Sleumer, Repert. Sp. Nov. 39: 46. 1935.

Smooth (to touch) liana with terete glabrate branches, pubescent branchlets, large solitary flowers and ample elliptic or ovate-elliptic chartaceous leaves, these glabrous above, pilose-puberulent on the 9 or so prominent lateral nerves beneath, entire or undulate, somewhat rounded or broadly cuneate at base, obtuse, the petioles 2.5–4.5 cm. long; pedicels 12 mm. long, 2 mm. thick, densely appressed gray strigose; sepals obovate-oblong, sericeous only without, 13–15 (–20) mm. long, 7–9 mm. wide, the obovate-spathulate greenish-white petals about 1.5 cm. long, 8–10 mm. wide; filaments glabrous, to 5 mm. long; ovary as style densely hirsute as the globose fruit.—Distinguished from *D. aptus* by the larger fewer-nerved leaves and three times as large flowers (author), the type to 20 meters tall with trunk to 3.5 dm. in diameter.

Loreto: Flood-free wood at mouth of the Santiago, *Tessmann 4128*, type; also *4418*.

Doliocarpus Rolandri Gmelin, Syst. Nat. 2: 805. 1791. *D. major* Gmelin, l.c. *D. dentosus* Mart. in Flora 24, App. 2: 65. 1844, fide Sandwith, Kew Bull. 171. 1931.

Branchlet tips and petioles early puberulent, the branches asperulous, exfoliating and glabrescent in age; petioles 4–11 mm. long, sulcate above, narrowly alate by the decurrent limb, this more or less elliptic, often spinulosely serrate toward the acutely acuminate apex, 5–13 cm. long, 2–6 cm. wide, sometimes merely repand or even entire, coriaceous, above sparsely, beneath densely lepidote (scales early with a central trichome), the midrib and 6–10 lateral nerves prominent both sides, the latter (as the former also above) appressed pilose beneath; pedicels 2–6, usually 3–8 mm. long, densely puberulent as the buds and suborbicular sepals both sides, these to 7 mm. long, 5 mm. wide; petals 3 or 4, broadly obovate, to 9 mm. long and wide, puberulent and glabrescent without; filaments recurved in bud, anthers oblong; carpel 1, hirtellous as the 11 mm. thick fruit, the 2 seeds compressed, to 7 mm. long, 5 mm. wide, nearly black.—After Lanjouw who questioned the identity of Garcke's plant, which ex char. seems to be nearer *D. dentatus* (i.e. *D. Rolandri* in lit.). Apropos this latter name, misinterpretation of a name's identity is no reason for discarding it. Var. *parcus* Macbr. has leaves to 2 dm. long, nearly 1.5 dm. wide, sparsely undulate-denticulate, softly pilose beneath, the petioles 2–3 cm. long, the 2–5-fasciculate pedicels 5–8 mm. long, differences probably not particularly significant, the type according to the collectors a tree 10 meters high. Not seen since publication; probably, ex char., goes to *D. dentatus*. F.M. Negs. 19165; 19166 (var.).

Loreto: Yurimaguas, *Killip & Smith 27545* (type, var.). Central and South America.

4. CURATELLA L.

Shrubs or small trees, the estipulate leaves scabrous with stellate silicified trichomes, the short panicles of white flowers typically on older branchlets at the leaf-scars. Sepals imbricate, 4 or 5, spreading, subequal, the petals as many. Stamens persisting, the filiform filaments apically dilated, the anthers usually introrse, dehiscing longitudinally. Carpels 2, cohering basally within.

Fruits 2 follicles in each flower, each with 2 seeds subenclosed in the membranous striate aril.

Curatella americana L. Sp. Pl. ed. 2. 748. 1762.

Stout shrub or tree to 12 meters, with rough exfoliating brown bark, gnarled densely scaly branches, the young branchlets early pubescent, and short panicles of fragrant white flowers commonly from the axils of fallen leaves; petioles (alate, rarely 1 cm. long) and leaves coated, the latter especially above, with almost minute harsh stellate trichomes; leaves variably elliptic but always decurrent from rounded or emarginate base and rounded-emarginate or obtuse at apex, often a dm. or two long, about half as wide, the 8–18 lateral nerves terminating in short teeth, prominent beneath; panicles 3–7 cm. long, closely pubescent including the pedicels (5–8 mm. long) and the 4 (or 5) roundish sepals both sides, these to 6 mm. long, reflexing; petals obovate, 6–7 mm. long, often denticulate, deciduous; carpels pubescent with long erect trichomes, the hispid globose follicles to 8 mm. thick.—Illustrated, St. Hilaire, Pl. Usu. *pl. 24* (as *C. Cambaiba*) and Pflanzenfam. ed. 2. 21: 19.

The sandpaper-like leaves are used for polishing (Weberbauer); abundant, sometimes forming thickets on the sandy plain of Tarapoto (Williams).

San Martín: Tarapoto, *Ule 6424* (det. Perkins); *Williams 5677*. Moyobamba, *Weberbauer 4578;* 290.—Huánuco: Chicoplaya, *Ruiz & Pavón*. To the West Indies and Central America. "Ractapanga" (Weberbauer).

ACTINIDIACEAE

Much like Dilleniaceae but the pistil solitary, placentation axillary, ovules with a single integument, many in each cell, the styles usually as many as carpels, generally persistent; fruit a tardily dehiscent berry or leathery capsule, the seeds non-arillate with usually large embryos and abundant endosperm.—There is probably no gain from the standpoint of usefulness in separating this family; the unit as a whole is said probably to be related to the Ranunculaceae; the segregate has been also called Saurauiaceae; cf. Lawrence, Taxonomy Vasc. Pl. 599. 1951.

SAURAUIA Willd.

Palaua R. & P. Prodr. 100. *pl. 22*. 1794. *Apatelia* DC. Prodr. 1: 526. 1824.

References: Buscalioni, Malpighia 25–30. 1912–1927; key, 25: 218–225; index, 30: 436–444; 25 & 26 by Buscalioni & Muscatello; Gilg & Werdermann, Pflanzenfam. ed. 2. 21: 44. 1925, after Diels, Bot. Jahrb. 57: 441. 1922.

Character of the family: The most recent account of these strikingly attractive plants is lacking in organization and presentation, but one may admire the author's inherent ability and interest, which prompted his studies, probably under difficulties. In any case specific characters to this day are not understood and a satisfactory treatment will probably be possible only with cytological as well as morphological data. Very apropos are the following observations of A. C. Smith, Journ. Arnold Arb. 22: 502. 1941, prompted by his studies of Papuasian species, which may be summarized here since they apply well to the Peruvian plants and may serve as a guide for field notes of collectors.

Smith agrees with Burtt, Hook. Icon. 34: *pl. 3316*. 1936, that position and branching of inflorescence, degree of bract development, pubescence of leaves beneath and other characters are not fundamental but for expediency are at present more or less usable, while probably the type of indument may prove to be basic in indicating true relationship; characters which are fairly stable (i.e., type, direction and length of hairs, shape of scales, size of flowers, number of stamens, their arrangement as that of styles, etc.) have not always been adequately described. Smith further notes that the abundant and obvious fusiform crystal-bearing cells (containing both raphides and styloids) in leaves, petals and ovaries of some species may be helpful in differentiating specific character.—The name is after one von Saurau and written *Saurauia* by Willdenow in his herbarium. There is therefore no justification for the spelling *Saurauja* by some authors.

Besides the following, some of the Colombian species proposed by R. E. Schultes, Caldasia 2, no. 6: 27–45. 1943, may occur in Peru, especially those from Putumayo, and several of the glabrate Ecuadorian species, similar to the earlier described Peruvian *S. glabrata*, sens. lat., are to be expected. Also omitted from the key is *S. isoxanthotricha* Busc., origin unknown.

Branches (flowering) glabrous or soon glabrate, the very short setae or indument sparse.

Indument lacking or nearly on mature leaves or confined to nerves.

Leaves ample, obovate.

Indument, except on younger parts, nearly lacking. *S. glabrata.*

Indument sparse but subpersisting.....*S. Weberbaueri.*

Leaves oblanceolate, about 3 cm. wide.....*S. Briqueti.*

Indument setulose-puberulent to tomentose on mature leaves beneath.

Leaves simply or minutely pubescent beneath.

Inflorescence densely spreading setulose.

Leaves setulose beneath.....*S. scabriuscula.*

Leaves except nerves, puberulent furfuraceous beneath. *S. pseudoscabra.*

Inflorescence minutely appressed setulose.....*S. peruviana.*

Leaves tomentose-stellate beneath.....*S. Raimondiana.*

Branches notably rather persistently long-setose-barbate, sometimes laxly, sometimes also densely scurfy-tuberculate.

Indument of leaves confined to the nerves.

Leaves ample, petioles elongate; flowers 7 mm. wide. *S. natalicia, S. Loeseneriana.*

Leaves medium, petioles 1 cm. long; flowers 5 mm. wide. *S. solitaria.*

Indument of leaves sparse, setulose on nerves and veins, lax on upper stems.....*S. Prainiana.*

Indument of leaves not restricted to veins beneath, scabrous-setulose above.

Stamens 30–40, perhaps more, but at most 80.

Leaves moderately bullate above only in age, setulose. *S. biserrata.*

Leaves very bullate and conic-tuberculate above, reticulate beneath.....*S. formosa.*

Stamens 130–140; indument of *S. biserrata*.....*S. roseotincta.*

Saurauia biserrata (R. & P.) Spreng. Syst. 4. Cur. Post 211. 1827. *Palaua biserrata* R. & P. Syst. Veg. 181. 1798. *Apatelia biserrata* (R. & P.) DC. Prodr. 1: 526. 1824. *P. lanceolata* R. & P. l.c. *A. lanceolata* (R. & P.) DC. l.c., not *S. lanceolata* DC. Mem. Soc. Phys. Hist. Nat. Genève 1: 421. 1822. *S. Ruiziana* Steud. Nom. encl. ed. 2. 2: 516. 1841, nomen. *A. lanceolata* (R. & P.) DC. var. *peduncularis* DC. l.c. *S. scabra* Poepp. var. *Prainiana* Busc.

Malpighia 27: 493. 1916. *S. Ruiziana* Steud. var. *pedunculariis* (DC.) Choisy, Mem. Soc. Phys. Hist. Nat. Genève 14: 116. 1855.

A 5 meter shrub, the branchlets, petioles and peduncles long-setose bearded; leaves oval-lanceolate-oblong, attenuate at both ends, subacute to acuminate, about 1 to sometimes 3.5 dm. long and 5–12 cm. wide, rather densely appressed setulose above, a little rough but scarcely scabrous to the touch, densely crisply villous beneath; peduncle axillary, 3–4 times longer than the petiole, villous-setose; racemes short; flowers crowded, large, pedicellate; sepals glabrous within, obovate, obtuse; petals pilose within at base as also the filaments; ovary glabrous; styles filiform.—*S. pseudo-ruitziana* Busc., Malpighia 30: 244. 1927, is probably included in the above description. It is based on a specimen by Pearce, Herb. Kew, of doubtful origin, and by the author is distinguished from true *S. Ruiziana* by the 80 stamens, setulose upper leaf surfaces, by the 25 instead of 23–26 nerves, shorter (1 cm.) inflorescence branches, their setae 4–5 mm. long instead of 8 mm. F.M. Negs 23915; 23920 (*S. lanceolata*); 23934.

Huánuco: Pillao and Muña, *Ruiz & Pavón*, type; *Woytkowski 34178*. Huacachi near Muña, *4181*. Cuchero, *Poeppig 1607*.—Ayacucho: Choimacota Valley, *Weberbauer 7545*.

Saurauia Briqueti Busc. Malpighia 30: 140. 1927.

Branchlets reddish, glabrous or the tip minutely tuberculate and puberulent; petioles 1–1.5 cm. long, glabrate or tuberculate-setulose under a lens; leaves oblanceolate, about 9 cm. long, 2.5–3 cm. wide, scabrous-granulose above but glabrous, similarly scabrous beneath and minutely puberulent; secondary nerves about 15, scarcely visible above, fine and slightly reticulate beneath; inflorescences about as long as leaves, glabrous or the branchlets minutely and sparsely puberulent-setulose; peduncle 3–4 cm. long, glabrous or nearly; pedicels slender, short; bracts 2–4 mm. long, linear; flowers 8–10 mm. broad, calyx lobes about 4 mm. long, petals much longer; stamens 20 or fewer, styles short.—Allied by author to *S. Weberbaueri* but there is no more difference in leaves than shown in type specimens of *S. scabriuscula*. A 4 meter shrub. Keyed, l.c. 25: 224. 1912. Illustrated, l.c. 28. *pl. 2, fig. 26*. F.M. Neg. 5750.

Junín: Huacapistana, 2,500 meters, *Weberbauer 2177*.

Saurauia formosa Sleumer, Notizbl. Bot. Gart. Berlin 12: 144. 1934. *S. Ruiziana* Steud. var. *Weberbaueri* Busc. Malpighia 26: 6. 1913.

Indument of the stout branchlets, lateral leaf-nerves, these about 25, and ample axillary inflorescences densely ferrugineous strigose the trichomes to 3 or 4 mm. long and rigid; petioles 5–11 cm. long; leaves obovate-elliptic, cuneate at base, gradually acuminate, 3–4 dm. long or longer, nearly half as wide, densely conic-tuberculate above (asperous), beneath especially on the densely reticulate elevated veins closely stellate, soft to touch, the thickened incurved margin minutely mucronulate, the incurved mucro 1 mm. high; panicles elongate, cymosely divided, to at least 3 dm. long (peduncles to 1.5 dm. long, 5–6 mm. thick); bracts densely strigillose, long-deltoid, 6–8 mm. long; flowers 22 mm. broad; calyx lobes 5, obovate-elliptic, obviously strigose, 7–8 mm. long, 4 mm. wide, the oblong-spatulate petals ciliate, about 11 mm. long, 4 mm. wide; interstaminal trichomes rufous; ovary glabrous.—Number of stamens unknown. A beautiful species, 4 meters tall, of the Section *Strigosae* Busc., in vicinity of *S. Ruiziana* (author). Illustrated, Busc. l.c. 25. *pl. 5, fig. 7* (his var. of *S. Ruiziana*).

Junín: Río Portachuelo near Calabaza, 2,800 meters, *Weberbauer 6637*, type. Above Huacapistana, *Sandwith 4563; Weberbauer 2040* (type, *S. Ruiziana* var. *Weberbaueri*), near San Ramón, *Hodge 6252*. —Huancayo: Oxapampa, *Soukup 2433?*—Huánuco: Pampayacu, *Sawada 53*.

Saurauia glabrata (R. & P.) Choisy, Mém. Soc. Phys. Hist. Nat. Genève 14: 119. 1855. *Palaua glabra* R. & P. Syst. Veg. 182. 1798.

Completely glabrous (type) except the branchlet tips, petioles (to 3 cm. long), and the large inflorescences, these with peduncles to 4 cm. long or longer, open, few-branched, minutely scurfy puberulent; leaves elliptic-obovate, somewhat narrowed to base, acutely short-acuminate or cuspidate, finely serrulate, to about 2 dm. long, 7 cm. wide; pedicels 4–6 mm. long; flowers about 1 cm. across; stamens apparently about 20.—In all probability several of the segregate species (as, in Peru, *S. Briqueti*, *S. Weberbaueri*) including also *S. pseudoparviflora* Busc. from Colombia and Bolivia and *S. Rusbyi* Britt. of Bolivia should be compared here as local developments if not variants. F.M. Neg. 23918.

Huánuco(?): *Ruiz & Pavón*, type.

Saurauia isoxanthotricha Busc. Malpighia 25: 410. *pl. 5, fig. 6*. 1913.

Branchlets fistulose-sulcate, clothed toward the apex with very long reddish setae; petioles to 3.5 cm. long; leaves coriaceous, softly setose both sides, especially on the 18 nerves, lanceolate-obovate, rounded-acute at base, acute or acuminate, 13–15 cm. long, 5 cm. wide, the slightly irregular serrations setulose; panicle branched, setose-scabrous, about equaling the leaves, the linear bracts 1 cm. long; flowers subsessile; calyx pubescent within and without; styles obsolete; ovary glabrous.—Unfortunate that the locality of any of the earlier names among several close forms should be unknown; from the illustration it seems to be near *S. Prainiana* among Peruvian species.

Peru(?): Without locality, (without collector, *1216*, Herb. Kew).

Saurauia Loeseneriana Busc. Malpighia 25: 399. 1913.

Smooth except for the rather sparse straggling long setae on the stems and petioles and the short appressed ones on the leaf-nerves beneath; leaves membranous, paler beneath, except for the midrib glabrous or nearly so above, long obovate-lanceolate, cuneate at base, shortly acuminate, 3 dm. long or longer, 8–11 cm. wide, mucronulate-denticulate; lateral nerves 25–30, about 1 cm. distant; inflorescence densely long-setose, few-flowered, little if at all exceeding the 3–4 cm. long petioles; bracts lanceolate, the upper triangular; flowers subsessile, medium; calyx 3 mm. long, puberulent throughout; stamens pilose at base; ovary glabrous.—Illustrated, l.c. 28. *pl. 2, fig. 28.* F.M. Neg. 5752.

Cajamarca: Tambillo, *Jelski 259.* Arenales, Prov. Cutervo, *Stork & Horton 10161* (det. Standley, *S. Ruiziana*).

Saurauia natalicia Sleumer, Notizbl. Bot. Gart. Berlin 12: 144. 1934.

Branchlets laxly pubescent with ferrugineous setae, the indument of the stout petioles (1–2.5 cm. long), leaf midnerve especially beneath, and axillary cymose-paniculate inflorescence laxly (or the last appressed) strigose; leaves elliptic-oblong, long-attenuate to base and more or less so to apex, 9–15 cm. long, 3.5–4 cm. wide, glabrous (except midnerve), membranous, somewhat and irregularly serrate-dentate, the lateral nerves 16–24; peduncles 5–8 cm. long; flowers 1.5 cm. broad; bracts minute; calyx lobes 5, obovate-oblong, 4 mm. long, nearly half as wide, glabrous; petals white, obovate-elliptic, 7 mm. long, 3.5 mm. wide; ovary glabrous.—There is a light pilosity at insertion of stamens; next to *S. Loeseneriana* Busc. with larger leaves and flowers, more strigose inflorescence (author).

Ayacucho: Choimacota Valley, *Weberbauer 7567; 7567a.*—Cuzco: Near Chile-Chile, Valle de Marcapata, 2,500 meters, *Weberbauer 7867*, type.

Saurauia peruviana Busc. Malpighia 27: 319. 1916. *S. floribunda* Benth. var. *peruviana* Busc. Malpighia 28: 119. 1917?

Branchlets more or less appressed setulose and stellulate pubescent, the 2–5 cm. long petioles tuberculate and stellate-puberulent; leaves chartaceous, glabrate but lightly scabrous above, setulose-puberulent beneath, obovate or oval-lanceolate, acute or acuminate, the base cuneate, mucronately and setosely serrulate, 2–3 dm. long, 7–10 cm. wide; inflorescence shorter than the leaves, few-flowered, the slender peduncles and branchlets furfuraceous and minutely appressed setulose; bracts minute; calyx rufescent, glabrous within, little shorter than the petals; stamens 25–30; styles elongate.—The variety proposed for the Ecuadorian species of Bentham seems better placed here, ex char., stems, petioles and inflorescence puberulent-tuberculate, leaves granulose above, minutely setulose and stellulate beneath. Illustrated, l.c. 25. *pl. 8, fig. 15.* F.M. Neg. 19162.

Amazonas: Chachapoyas, (*Mathews*, type, *S. floribunda* var.). Without locality, *Haenke*, type; *Mathews.*

Saurauia Prainiana Busc. Malpighia 25: 248. *pl. 6, fig. 10.* 1912.

Branchlets, petioles and inflorescence barbate-setose, not at all or very obscurely puberulent; leaves oval or little obovate, about 2 dm. long, 6–10 cm. wide, usually obtuse at base, acute or shortly acuminate, chartaceous, minutely and sparsely scabrous above and setulose on nerves, paler and lightly setulose on all the veins beneath, very minutely mucronate-denticulate; lateral nerves 16–18, about a cm. distant; axillary racemes sometimes a dm. long; bracts linear-lanceolate, 4–5 mm. long; flowers subsessile, about 7 mm. wide, the oval sepals setulose without, the slightly longer oblongish petals about 7 mm. long; stamens about 25; ovary glabrous.—A 5–10 meter tree. F.M. Neg. 5753.

Loreto: Cerro de Escaler, *Ule 6530*, type. Pumayacu, Balsapuerto to Moyobamba, *Klug 3176* (det. Standley).

Saurauia pseudoscabra Busc. Malpighia 28: 1. 1917.

Stem tips and petioles (1.5–2.5 cm. long) spreading setulose with trichomes in part 3–5 mm. long; leaves finely serrulate, coriaceous,

decurrent to base, acute or acuminate, 1–2 dm. long, 4–6 cm. wide, minutely scabrous-setulose above, beneath the 13–14 prominent nerves setulose, the surface somewhat furfuraceous or softly setose; panicles many-flowered, subequaling the leaves, the stout peduncles 7–10 cm. long, branches 1–2.5 cm. long, bracts 3–6 mm. long; flowers subsessile; calyx lobes 3–4 mm. long, glabrate or minutely and sparsely setulose; stamens 25; styles 5, long.—May be a part of *S. scabriuscula* but there seem to be distinctions of possible significance; the stem pubescence suggests that of the more northern *S. tomentosa* HBK. with large flowers. F.M. Neg. 5756.

Puno: Sandía to Cuyocuyo, 2,300 meters, (*Weberbauer 842*, type).

Saurauia Raimondiana Sleumer, Notizbl. Bot. Gart. Berlin 12: 145. 1934.

Characterized especially by the presence of three types of indument on the leaves, a tomentosity of very short branched trichomes on petioles (3.5 cm. long), midrib and the 16–19 lateral nerves beneath, ferrugineous stellate trichomes on the leaf-surfaces apart from the principal nerves, but lanuginose-barbate in their angles with the midrib; leaves cuneate-oblong, gradually acuminate, 1.5–2.5 dm. long, 4.5–8 cm. wide, chartaceous, densely and obtusely serrulate; panicles many-flowered, about half as long as the leaves, more or less densely pubescent with shortly branched trichomes; flowers about 1.5 cm. broad; calyx lobes 5, ovate-elliptic, 5 mm. long, 3 mm. wide, sparsely stellate-puberulent dorsally; petals nearly subrotund, 7 mm. long, 6 mm. wide; stamens many, 5 mm. long; ovary glabrous.—On account of the tomentose indument ought to belong to the *Tomentosae* Busc. of Section *Ditrichae* Busc. but the presence of the stellate trichomes places it at a distance (author). Var. *caxamarcensis* Sleumer, l.c. 146, has leaves 12 cm. long, 3.5–4 cm. wide, tomentose as panicle, this as long and the flowers apparently a little smaller.

Cajamarca: Montaña de Nanchó, *Raimondi 4758*, type; also *6644; 5394* (type, var.), *7331*.

Saurauia roseotincta R. E. Schultes, Bot. Mus. Leafl. Harvard, 16: 83. 1953.

Slender open tree, the leaves—these only on the upper part—pink-red pubescent beneath, the white flowers not abundant; petioles stout, to 3.5 cm. long, 4–5 mm. thick, coarsely as the inflorescence, this about 2 dm. long, rufous- or ferrugineous-setose; leaves elliptic,

minutely denticulate, cuneate basally, subacute, 21–34 cm. long, 7–11 cm. wide, subcoriaceous, bullate and asperous-setose above, especially toward the nerves, softly and minutely white stellate-pilose all over beneath and all the nerves densely roseate stellate-pilose; bracts setose-pilose, subulate, mostly 5 mm. long; flowers 13 or 14 mm. across, the rounded subentire petals 6–7 mm. long, 5–6 mm. wide; sepals 5, the inner rhomboid-ovate, 9–10 mm. long and wide, setose-carinate without, puberulent within toward obtuse apex as the thicker subacute outer, these strongly golden without, 5–6 mm. wide; filaments about 130, rufous setose below, 23 mm. long, the anthers small; ovary globose, 4 mm. in diameter, glabrous, the 5 styles to 1.5 mm. long.—Near *S. biserrata* (R. & P.) Spreng. (*S. Ruiziana*) and relatives with only a few stamens (author). Well-named, the type about 3 meters high.

Huánuco: Chaglla, *3652*, type.

Saurauia scabriuscula Macbr., nom. nov. *S. scabra* Poepp. ex Choisy, Mém. Soc. Phys. Hist. Nat. Genève 14: 118. 1855, not HBK.

Branchlets, petioles and panicles harshly pubescent and reddish tomentulose; petioles 1.5–3 cm. long, stout; leaves coriaceous or chartaceous, green but scabrous and minutely setulose above, rather densely reddish setulose beneath and rather softly so, obovate-lanceolate or oblanceolate, mostly 7–16 cm. long, (3) 4.5 (–6) cm. wide, barely acute, cuneate at base, most minutely denticulate; flowers tiny, about 2.5 mm. wide; calyx glabrous; ovary glabrous; styles long; stamens 20–25, the anthers terminally dehiscent but by a cleft instead of the usual pore (Gilg).—Reluctantly I give this a new name because of the mechanical necessity; there is doubtless, sens. lat., a synonym which will eventually supply the need but ex char. none of the Peruvian species seem to be quite the same and until the group is revised it seems better not to apply a name already in use, not positively applicable. F.M. Negs. 5754; 23294.

Huánuco: Cuchero, *Poeppig 1694*. Chinchao, *Sawada 97*.

Saurauia solitaria Sleumer, Notizbl. Bot. Gart. Berlin 12: 147. 1934.

Densely leafy branchlets strigose with trichomes to 3 mm. long; petioles 1.5 cm. long; leaves cuneate-oblong, shortly acuminate, 16–23 cm. long, 5–6.5 cm. wide, chartaceous, glabrous except the strigose-pilose midnerve both sides and the 14–16 lateral nerves, these

sparsely strigose beneath; marginal serrations elongate-triangular, strigillose at tip, about 2 mm. high; panicles about a third as long as the leaves, rather densely many-flowered, the peduncles 7 cm. long; flowers 8 or 9 mm. across; bracts minute; pedicels (as peduncles) closely ferrugineous strigose; calyx lobes ovate-elliptic, 3 mm. long, 1.8 mm. wide, glabrous; petals roseate, elliptic-rotund, 4–4.5 mm. long, 2.5 mm. wide; ovary glabrous.—Section *Strigosae* Busc. without apparent relationship (author). Type a shrub 2 meters high.

Libertad: Valley of the Mixiollo, Prov. Pataz, about 1,800 meters, *Weberbauer 7067*, type.

Saurauia Weberbaueri Busc. Malpighia 30: 148. 1927.

Allied to *S. Briqueti* but distinctive in its much larger cuneate-obovate leaves, 1.5–2 dm. long, 6–8 cm. wide, on long petioles, ample (nearly 2 dm. long) inflorescence with pubescent peduncle, evident linear bracts, and 4 instead of 5 styles.—As to this character the number of styles in some species apparently varies; it seems probable that it is a part of *S. glabrata* if not also of *S. Briqueti*. A shrub. Illustrated, l.c. 25. *pl. 5, fig. 8*. F.M. Neg. 5762.

Amazonas: Chachapoyas, 2,600 meters, *Weberbauer 4454*.

OCHNACEAE

References: Gilg, Pflanzenfam. ed. 2. 21: 53–87. 1925; Engler in Mart. Fl. Bras. 12, pt. 2: 297–366. 1876; 13, pt. 1: 397–420. 1871.

Rarely herbs or half-shrubs, commonly simple-leaved plants, the leaves always stipulate (stipules often deciduous), alternate, glabrous and usually with numerous pinnate nerves. Flowers hermaphrodite, variously diposed, sometimes solitary, the sepals and petals free, imbricate or rarely contorted, especially the latter, these 5 (4–10), the former 4–5 (rarely 10). Stamens inserted at base or above a disk or torus, few to many, distinct, sometimes accompanied by free or connate staminodia, these subulate or petaloid, the filaments persisting; anthers linear, basifixed, opening by a pore or longitudinally. Ovary entire to deeply lobed, 1–10-celled, the 1-many ovules variously attached; style 1, rarely parted apically. Fruit an elongated capsule and septicidal or drupaceous, the carpels connate or finally often distinct on the enlarged torus. Seeds 1-many, with or without endosperm, this character serving as the basic division of the family; however, the following artificial key seems to distinguish the few Peruvian genera.

The last 3 genera in the following key have sessile radiating stigmas (Dwyer) and as in *Godoya* stamens are in one row.

Suffrutescent herbs or slender stemmed shrubs with notably pectinate-ciliate stipules.....2. *Sauvagesia.*

Shrubs or shrub-trees, the stipules deciduous or inconspicuous.

Leaves oblong-lanceolate or -elliptic, sometimes basally acute, but not narrowed to base unless also to apex.....1. *Ouratea.*

Leaves obovate or spathulate, distinctly narrowed to base, broadest above the middle or rounded-obtuse.

Leaves long-spatulate, several times longer than wide; stamens many; stipules persisting.....3. *Cespedesia.*

Leaves obovate, about twice longer than wide; stamens 10; stipules deciduous.

Flowers about 2 cm. long; leaves crenate; sepals glandular within.....4. *Godoya.*

Flowers about 1 cm. long; leaves minutely appressed denticulate; sepals not glandular.....5. *Krukoviella.*

1. OURATEA Aublet

Glabrous shrubs or trees with evergreen lustrous serrulate or entire leaves, the small stipules deciduous, and pretty yellow or sometimes reddish tinged flowers usually in bracteate terminal or axillary panicles or racemes. Sepals and petals 5, the former often coherent and persisting, the latter little longer, ordinarily obovate and clawed. Stamens 10, the very short filaments from the base of a disk, the rugose anthers opening from a terminal pore. Ovary 5–10-lobed; styles united; ovules solitary. Drupes 5 or fewer on the expanded fleshy disk, the seed erect.

The standing of the species proposed in this large group which has had no revision for a long time is in many cases open to question and the key naturally is only suggestive; the traditional separation of species on the basis of leaf-venation seems often intangible or possible of diverse interpretation; under these circumstances it has not been within the scope of this work for me to try evaluation of the species proposed for Peru particularly as regards their relationship to extra Peruvian entities, nor to dispose of all collections.

Veins innumerable, mostly parallel, little joining; flowers 5–7 mm. long or if larger inflorescence pendulous or racemose.

Petals about 9 mm. long; inflorescence elongate, pendulous, simple. *O. phaeophylla, O. pendula.*

Petals 5–7 mm. long; inflorescence rather erect or suberect, sometimes more or less paniculate.

Inflorescence racemose or racemiform.

Leaves chartaceous-coriaceous, mostly or all several cm. wide or if narrower very opaque.

Leaves about twice as long as wide, obtuse or acute. *O. tarapotensis.*

Leaves, at least mostly, about three times longer than wide, acutely long-acuminate. . . . . *O. iquitosensis.*

Leaves membranous, lustrous, about 2.5 cm. wide. *O. Williamsii.*

Inflorescence a pyramidal panicle. . . . . *O. Weberbaueri.*

Veins many, but more or less reticulate; flowers about 1 cm. long or longer or the inflorescence more or less pyramidal-paniculate not racemose or pendulous.

Leaves broadest medially, about 3.5 dm. long, 9–12 cm. wide. *O. amplifolia.*

Leaves oblong, about 2 dm. long, 6–8 cm. wide.

Leaf-veins elevated. . . . . *O. aromatica.*

Leaf-veins obscure. . . . . *O. oleosa.*

Ouratea amplifolia Sleumer, Notizbl. Bot. Gart. Berlin 13: 349. 1936.

Glabrous slender tree, the trunk only 5 cm. thick, 4 meters tall, the very stout branchlets reddish-brown (herb.); petioles to 12 mm. long, canaliculate above; leaves broadest medially, subrotund basally, shortly and acutely acuminate apically, about 3.5 dm. long, 9–12 cm. wide, rigid-coriaceous, somewhat lustrous above, paler beneath, coarsely serrate (with about 4 per centimeter, 1–1.5 mm. high) or subsinuate-dentate toward the tips, midnerve prominent both sides, the 25–30 primary lateral ones moderately raised, the numerous subhorizontal secondary ones faint; panicles erect, about 12 cm. long, dense; rachis and pedicels rugulose, the latter thick, 8–10 mm. long; sepals oblong, 8–9 mm. long, 5–6 mm. wide, green, the inner 3 lutescent margined, about equaling the yellow petals and stamens; filiform style 7 mm. long.—Distinguished by author from *O. gigantophylla* (Erh.) Engler by the much more numerous raised instead of impressed veins and shorter pedicels.

Loreto: Mouth of the Santiago, flood-free woods, (*Tessmann 4719*, type).

Ouratea aromatica Macbr., sp. nov.

Fruticosa glaberrima; petiolis circa 5 mm. longis, 2–3 mm. crassis foliis flexile coriaceis, supra nitidulis oblongo-vel interdum ovato-ellipticis, basi rotundatis, ad apicem late vel paullo angustatis, subobtuse acutis, plerumque 12–15 cm. longis, 5–6.5 cm. latis vel circa 9 cm. longis, 4–4.5 cm. latis, minute denseque serrulatis basin versus integris, utrinque nervis lateralibus et venis numerosis laxe reticulatis conspicue elevatis: paniculae laxiflorae circa 2 dm. longae vel interdum solum 3–5 cm. longae, ramis inferioribus 1.5–8 cm. longis; pedicellis laevibus 10–13 mm. longis, sepalis anguste ovato-lanceolatis margine conspicue scariosis, 1 cm. longis; petalis obovatis apice rotundatis circa 12 mm. longis, staminibus circa 6 mm. longis.—Plant 5 meters tall, stem 2 dm. in circumference, flowers ochre yellow, aromatic (Schunke); suggests *O. odora* Poeppig ex Engler in Mart. Fl. Bras. 12, pt. 2: 334. 1876, with acutely acuminate leaves, longer petioles, and *O. Spruceana* Engler in the inflorescence but the nerves and veins not impressed, rather elevated.

Loreto: Gamitanacocha, Río Mazán, *José Schunke 33*, type.

Ouratea iquitosensis Macbr. Candollea 5: 382. 1934.

Quite glabrous shrub, the stout branchlets somewhat flexuose, the petioles deeply sulcate, 3.5–5 mm. long; leaves oblong-lanceolate or sometimes elliptic-oblong, rounded to the shortly acute base, gradually and acutely acuminate, mostly about 12 cm. long, 3–4 cm. wide, or to 15 cm. long, 5.5 cm. wide, lightly serrulate nearly to base, firm, opaque, the strongly arcuate lateral nerves finally ascending, the horizontal veins numerous, both rather prominent beneath; panicles nearly simple or racemiform, dense, 3–4 cm. long; pedicels slightly angled, smooth, slender, 7–9 mm. long, subequaling the conic-ovate buds; sepals oblong-lanceolate, acute; petals oblong-obovate, obscurely clawed, nearly 7 mm. long, scarcely 3 mm. wide; gynophore and ovary subequal, the filiform style much longer.—By typographical error petals described as nearly 10 mm. long. With some of the characters of *O. olivaeformis* (St. Hil.) Engler but differing essentially in its dull leaves with distinctive venation; maybe comparable too to *O. garcinioides* Ule, Notizbl. Bot. Gart. Berlin 6: 338. 1915, with oblong barely and shortly acuminate leaves; as some other species it always grows, apparently, on inundated banks.

Loreto: Iquitos, *Williams 1498*, type; also *1491; 1492; 1496; 1497; 1499; 1503*.

Ouratea oleosa Macbr., sp. nov.

Arbor, ramulis subteretibus rubro-brunneis, nitidulis; petiolis 8–10 mm. longis, 3.5–5 mm. crassis; foliis fere oblongo-ellipticis, basi subrotundatis, apice subabrupte breviterque acuminatis, circa 2 dm. longis, 6–8 cm. latis, subcoriaceis, supra nitidulis, plus minusve remote serrulatis; nervis lateralibus tenuibus numeroissimis obscuris vel vix prominulis; paniculae crassae, 1.5 dm. longae, dense granulosae, ramis circa 2 cm. longis; pedicellis 1 cm. longis, vix 1 mm. crassis; sepalis ovato-lanceolatis, 1 cm. longis; petalis obovato-oblongis, circa 1 cm. longis; staminibus 7 mm. longis; stylo circa 8 mm. longo.—Apparently, as *O. amplifolia*, in the general group of the Brazilian *O. gigantophylla* (Ehr.) Engler; certainly has nothing in common with *O. tarapotensis*, to which Standley referred it. At least in the herbarium the leaves have an oily sheen.

San Martín: Juanjuí, *Klug 4295*, type.

Ouratea pendula (Poeppig) Engler in Mart. Fl. Bras. 12, pt. 2: 339. 1876. *O. Killipii* Macbr. Candollea 5: 383. 1934, fide Sleumer.

Small tree with oblanceolate chartaceous leaves the serratures small, not mucronate, the veins prominent, especially above, and narrow racemiform panicles sometimes nearly a dm. long; petioles 4–7 mm. long; leaves entire toward the cuneate base, acuminate, 1.5–2 dm. long, 5–6 cm. wide, the 15 or so arcuate primary nerves forming an angle of about 80° (the lesser at right angles) with the well-defined midrib; pedicels 1–3 fascicled, 5–6 mm. long; buds oblong, acute, 7 mm. long; sepals lanceolate, acute, broadly scarious margined, 8–9 mm. long, equaled by the petals; carpels 5.—I distinguished my proposed species principally on the comparative size of the petals (obovate, nearly 5 mm. long) and sepals (to 3 mm. long); actually they are somewhat longer. F.M. Neg. 9684.

San Martín: Tocache, *Poeppig 2027*, type.—Loreto: Iquitos, *Killip & Smith 27169* (type, *O. Killipii*). Yurimaguas, *Williams 3812; 4530; Killip & Smith 27972*. Surinam?

Ouratea phaeophylla Sleumer, Notizbl. Bot. Gart. Berlin 13: 351. 1936.

Type a shrub 1 meter high with slender terete branchlets and chartaceous densely and regularly serrulate lanceolate-oblong leaves;

petioles 5–6 mm. long; leaves broadly cuneate at base, more or less shortly acuminate, the tip itself acute, subcurved, drying deep castaneous above, pale brown beneath, 12–15 cm. long, 3–4.5 cm. wide, serrations very acute, about 6 per centimeter and 1 mm. high, the midnerve prominent both sides, lateral nerves obscure, primary curved-ascending, secondary more or less horizontal; racemes simple, 3.5–6.5 cm. long, pedicels 3–4 mm. long; sepals ovate-lanceolate, acuminate, 6–7 mm. long, 2 mm. wide below, the apically rounded petals twice as wide, about 9 mm. long; style 5 mm. long.—Comparable to *O. pendula* but has smaller thinner sharply serrate leaves, thicker rachis, shorter pedicels (Sleumer). The Killip & Smith specimen has leaves to 5.5 cm. wide, pedicels to 1 cm. long, fruits about 6 mm. in diameter.

Junín: Cahuapanas, Río Pichis, *Killip & Smith 26718?* (fruit).—Loreto: Yurimaguas, *Killip & Smith 27703?* (fruit); *28200?* (fruit). Río Nanay, *Williams 768.*—Cuzco(?): Rain forest near Río Apurímac, 600 meters, (*Weberbauer 5629*, type).

Ouratea tarapotensis Macbr. Candollea 5: 384. 1934.

Small essentially glabrous shrub, the strongly sulcate petioles mostly 3, occasionally 4 mm. long; leaves elliptic or oblong-elliptic, narrowed and acute to rounded or even emarginate at base, rounded, obtuse or shortly acute at tip, commonly 10–12 cm. long, 4–5 cm. wide, minutely but densely serrulate or sometimes mucronate-serrate except toward base, chartaceous-coriaceous, scarcely lustrous, the little prominent lateral nerves arcuate-ascending, the numerous veins subhorizontal; panicles dense, racemiform, about 3 cm. long; pedicels slender, smooth or obscurely tuberculate, 5–8 mm. long, often distinctly longer than the ovoid glabrous buds; sepals narrowly ovate-lanceolate, 5 mm. long, only slightly exceeded by the oblong or narrowly oblong-obovate obtuse scarcely basally narrowed petals; gynophore and ovary subequal, the former in fruit obovoid, 5–7 mm. long; drupes subclavate-ovoid, to nearly 1 cm. long, 7 mm. thick, olivaceous, lustrous, more or less veiny.—Apparently peculiar to the Tarapoto region and no comparable species discovered by me.

San Martín: Tarapoto, *Williams 6720* (flowers); *5748*, type sheets; also *6640; 6644; 6908.*—Loreto: Yurimaguas, *Williams 4301?*

Ouratea Weberbaueri Sleumer, Notizbl. Bot. Gart. Berlin 13: 355. 1936.

Sparsely branched shrub or small tree to 5 meters tall with shortly petioled oblong subcoriaceous leaves and lax panicles, about

1 dm. long, of small (5 mm. long) flowers; leaves attenuate both ends, subacute, drying grayish-green above, pale olive beneath, 13–21 cm. long, 5–7.5 cm. wide, regularly denticulate (teeth obtuse, about 5 per centimeter, scarcely 1 mm. high), midnerve plane above, prominent beneath, primary lateral nerves about 10, lightly but distinctly impressed, prominent beneath, arcuate, not at all joining, secondary lateral nerves or veins slightly elevated; lowest panicle branches 3–4 cm. long, progressively shorter, the uppermost hardly 1 cm. long; rachis slender, the pedicels 3–5 mm. long, elongating after anthesis; sepals lanceolate, acute, 5–6 mm. long, 1.8 mm. wide, the similar petals deep yellow; style 3 mm. long.—Habit of *O. olivaeformis* (St. Hil.) Engler, the flowers much smaller (Sleumer); in the inflorescence and small flowers suggests *O. aquatica* (HBK.) Engler.

San Martín: Zepelacio, *Klug 3434; 3517; 3720.*—Loreto: South of Moyobamba, 1,200 meters, *Weberbauer 4683*, type.

Ouratea Williamsii Macbr. Candollea 5: 384. 1934.

Graceful slenderly branched shrub; petioles 2–3 mm. long, canaliculate above; leaves oblong-lanceolate, cuneately narrowed both ends, acute, mostly about 7 cm. long, about 2.5 cm. wide, or sometimes 11 cm. long, subentire or slightly serrulate especially toward the base, nearly translucent membranous, lustrous, the approximate very fine nerves and veins obscure on both surfaces; panicles terminal, racemiform, 3.5–7 cm. long; pedicels subalate with a solitary fugacious bract, slender, about 5 mm. long, equaling the ovoid buds, or in fruit to 12 mm. long; sepals narrowly ovate, acutish; petals scarcely acute, probably little longer than the calyx; gynophore oblong-ellipsoid; drupes unknown.—Resembles *O. lucens* (HBK.) Engler but differs particularly in the much longer slenderer pedicels; the thinner leaves, essentially racemose flowers seem to distinguish it from *O. aquatica* (HBK.) Engler.

San Martín: Tarapoto, *Williams 6707*, type; also *6090.*—Huánuco: Above Cayumba, *Mexia 8306A* (det. Standley, *O. iquitosensis*).

2. SAUVAGESIA L.

Herbs or more or less suffrutescent below with mostly small often callus-margined leaves and pectinate-ciliate stipules. Flowers pink or white, axillary or terminal and bracted by reduced leaves. Sepals and petals 5, the former persisting, appressed to the septicidal

3-valved capsules, the latter convolute, deciduous. Fertile stamens, alternating with staminodia, the latter usually in 2 series, the outer filiform, the inner opposite the petals, scale-like, or petaloid. Anthers linear, laterally dehiscent. Ovary 3-celled at base, 1-celled above, the cells with many ovules in 2 rows, the numerous seeds reticulate.

Leaves and stipules imbricate; pedicels about 5 mm. long. *S. fruticosa.*

Leaves and stipules remote; pedicels soon about 1 cm. long. *S. erecta.*

Sauvagesia erecta L. Sp. Pl. 203. 1753.

Slender semiprostrate to erect reddish brown stems more or less ligneous toward the base, often 1–several dm. high; stipules lanceolate-linear, long-ciliate, to 1 cm. long; leaves oblong-lanceolate, attenuate to very short petiole, acute, to 2 cm. long or somewhat longer, usually 5 (–8) mm. wide, membranous, callous-serrate, the primary nerves more prominent above; flowers solitary or few in axillary cymes; pedicels about 1 cm. long; sepals oblong, acute, mucronate, to 6 mm. long, the somewhat longer obovate petals white or pink and darker at base; outer corona uninterrupted, the inner completely elliptical staminodia; capsules ovoid, acute, scarcely exserted.—*S. rubiginosa* St. Hil., treated as a variety by Eichler, may extend from Amazonian Brazil; the upper leaves are somewhat reduced resulting in racemiform inflorescences sometimes several cm. long and suggests *S. Sprengelii* as interpreted by Dwyer in herb. Usually along trails and in clearings; only a few of many collections seen cited.

Ruiz and Pavón found an infusion being used for "sickness of the chest."

San Martín: Zepelacio, *Klug 3404.* San Roque, *Williams 7114; 7650.* Lamas, *Williams 6363.* Near Moyobamba, *Woytkowski 35345.*—Huánuco: Chacahuasí, *Ruiz & Pavón.* Cuchero, Chinchao and Pillao, *Ruiz & Pavón.* Grassy clay banks, Pampayacu, *5040.*—Junín: Chanchamayo Valley, *Schunke 491; 1479.*—Cuzco: Shrub wood and grass steppe formation, 1,700 meters, *Weberbauer 7828.*—Loreto: Below Yurimaguas, *Allard 22457* (det. Lyman Smith). Mishuyacu, *Klug 455.* Pongo de Manseriche, *Dennis 29142.* Covering wet beaches, Río Santiago, *Mexia 6159.* Río Nanay, *Williams 860.* Widely distributed in the Tropics. "Yerba de San Martín" (Ruiz & Pavón).

Sauvagesia fruticosa Mart. Nov. Gen. & Sp. 1: 38. 1824. *S. rosacea* Ule, Notizbl. Bot. Gart. Berlin 6: 344. 1915.

More or less suffrutescent, subverticillately much branched, the older branches often covered with the persisting lanceolate pectinate 3–6 mm. long stipules; leaves subsessile, somewhat spreading, crowded, oblong- or linear-lanceolate, repandly glandular-serrate, narrowed to base, acute, 1–2 cm. long, (1) 3–4 mm. wide, lustrous green above, paler beneath; flowers 2–4, pedicels 3–5 mm. long; sepals subequal, oblong-lanceolate, acute, 3–4 mm. long; petals roseate, oblong, obtuse, 4 mm. long or somewhat longer; outer staminodia lacking or filiform, in pairs or solitary, capitately enlarged apically and alternating with the attenuate purple inner series; capsules 5 mm. long, exserted; seeds brown, ellipsoid, scrobiculate, 1 mm. long.—The flower clusters are mostly toward the branchlet tips and thus often form a leafy raceme. Description drawn to include Ule's characterization which by the presence of some outer staminodia caused him to ally his species to *S. deflexifolia* Gardner of Brazil, and Dwyer to *S. Sprengelii* St. Hil., Mém. Mus. Hist. Nat. Paris 11: 98. 1824, of Brazil with the staminodia in a continuous series as in *S. erecta;* how much dependability can be placed on this apparently variable character is a subject for investigation. The related but distinct *S. ramosissima* Spruce of the upper Amazon has 2 mm. long flowers in apical pseudo-umbels, the staminodia fasciculate and alternating. F.M. Neg. 9664.

San Martín: Tarapoto, *Spruce 4244* (det. Eichler); *Williams 5956*. Cerro de Escalero, *Ule 6352* (type, *S. rosacea*). Amazonian Brazil.

3. CESPEDESIA Goudot

Reference: Dwyer, Lloydia 9: 54–61. 1946.

Fine glabrous trees with crowded ample coriaceous crenate leaves and large terminal ebracteate panicles of yellow flowers. Stipules scale-like on petioles often filamentose within. Sepals and petals 5, the former equal, small, deciduous, the latter convolute, much larger. Stamens 10–many, inserted at base of truncate torus in about 3 series; anthers curved, linear, with 2 apical pores or clefts. Ovary 4–5-celled, sometimes imperfectly, the stigma sessile, simple. Capsules septicidally 5-valved with numerous minute seeds.—Named for M. Céspedes, cleric and professor of botany at Bogotá; there seems to be no reason for changing the original spelling to *Cespedezia*.

Cespedesia spathulata (R. & P.) Planch., Hook. Lond. Journ. Bot. 5: 647. 1846. *Godoya spathulata* R. & P. Prodr. 58. 1794. *C. Sprucei* van Tiegh. Ann. Sci. Nat. sér. 8. 19: 51. 1904. *C. amazonica* Huber, Bol. Mus. Goeldi 7: 302. 1913.

Stipules conspicuous, to 6 cm. long, 1.5 cm. wide at base, obtuse, often splitting marginally or cleft at apex; petioles stout, flat above, to 8 mm. wide; leaves obovate-spatulate, 4–10 dm. long, 12–18 cm. wide, tapering toward truncate-obtuse apex, sinuate margined, the lateral nerves ridge-like above, at the middle 7–15 (20) mm. distant; flowers mostly in threes, pedicels and fleshy petals at anthesis 13–20 mm. long; sepals to 3 mm. long; capsules often falcate, to about 7 cm. long, 4 mm. wide, the oblong seeds 1 mm. long, the wings 8–15 mm. long.—After Dwyer, as also synonymy. *C. repanda* (HBK.) van Tiegh. of Colombia, doubtfully in Peru, seems to be a variant, the nerves 1.5–2.5 cm. distant, pedicels 7–12 mm. long, petals 1–1.5 cm. long. A 6–25 meter tree with golden yellow flowers. F.M. Negs. *9643; 21946* (both *C. Sprucei*).

San Martín: Zepelacio, *Klug 3428*. San Roque, *Williams 7675;* Lamas, *6460*. Monte Campana, *Spruce 4831* (type, *C. Sprucei*).—Huánuco: Cuchero, *Ruiz & Pavón*, type; *Poeppig 1287*.—Junín: La Merced, *Killip & Smith 23888*.—Loreto: Balsapuerto, *Klug 2851*. Mishuyacu, *Klug 124*. Río Santiago, *Tessmann 4178*. To Colombia and British Guiana.

4. GODOYA R. & P.

Reference: Dwyer, Lloydia 9: 47–50. 1946.

Tall trees with lenticellate annulate branches, golden yellow flowers in axillary and terminal racemes or panicles and simple coriaceous sessile or subsessile crenate leaves. Sepals 5, erect, unequal, fimbrillate-ciliate at base within, deciduous. Petals 5, yellow, obovate, convolute. Disk inconspicuous. Stamens 10 in a single whorl (staminodia none), declinate, the subsessile linear anthers apically 2-pored. Ovary excentric, shortly stiped, linear-oblong, rostrate, 5-celled as the septicidal 5-valved capsule, the compressed seeds numerous.—Commemorates D. Manuel de Godoy, professor of botany at Madrid. Both *G. oblonga* and *obovata* are known by the name of "laupe" and their wood is valued for durability and resistance (Ruiz & Pavón).

Godoya obovata R. & P. Syst. Veg. 101. 1798. *G. oblonga* R. & P. Prodr. 58. *pl. 11*. 1794.

Branches with scattered lenticels and conspicuous leaf-scars, these sometimes 4.5 mm. wide; leaves obovate, cuneate at base, triangular or obtuse at apex, 6.5–13 cm. long, 3–6.5 cm. wide, minutely serrate, the secondary veins 3–10 mm. distant, drying lustrous and brown or darker above; buds glandular-glossy, to 2.5 cm. long, 11 mm. wide, the racemiform inflorescences to 2 dm. long, with whorled imbricate striate oblongish obtuse or retuse bracts to 2 cm. long, the subannular scars to 3 cm. distant; pedicels ligneous, 0.5–2 cm. long, articulation 4–8 mm. long; sepals to 1.5 cm. long, 3–5 mm. wide, entire, obtuse, retuse or even deeply cleft; petals unequal, obovate-elliptic, 2–3 cm. long, to 2 cm. wide, retuse; anthers smooth, apparently inflated; ovary linear-fusiform.—After Dwyer. To 25 meters high (Sawada). Illustrated, R. & P. Fl. Peruv. 4: *pl. 378;* Dwyer, l.c. 49 (flowers).

Huánuco: Macora and Cuchero, *Ruiz & Pavón,* type; *Poeppig.* Chinchao, *Sawada 92.* Bolivia. "Laupe."

5. KRUKOVIELLA A. C. Smith

Reference: John D. Dwyer, Torreya 45: 69–72. 1945.

Planchonella van Tiegh. Ann. Sci. Nat. sér. 8. 19: 39. 1904, not Pierre, Not. Bot. Sapot. 34. 1890.

Shrub, possibly scandent, lenticels evanescent, stipules glandular-appendaged on inner margin, petioles short, the serrulate margins of the leaf-blades minutely denticulate, the secondary veins conspicuous, subplanate. Inflorescence paniculate, the elongate rachis much branched; pedicels shortly articulate. Sepals and petals 5, the former without glandular appendages, the latter often bilobed. Stamens 10 in one series, dehiscing by a single terminal pore. Pistils solitary, 5–carpellate, the very short style with 5 radial sessile stigmas; ovules imbricate in several rows on 5 intrusive T-shaped placentae. Fruits capsular, fusiform-falcate, the seeds short winged. —After Dwyer. Commemorates the enthusiastic botanist B. A. Krukoff; as pointed out by Dwyer the genus must rest on less character than originally thought but is a convenient and meritoriously named segregate.

Krukoviella disticha (van Tiegh.) Dwyer, Torreya 45: 71. 1945. *Planchonella disticha* van Tiegh. Ann. Sci. Nat. sér. 8. 9: 39. 1904. *K. scandens* A. C. Smith, Journ. Arnold Arb. 20: 296. 1939. *Godoya disticha* (van Tiegh.) Ule, Notizbl. Bot. Gart. Berlin 6: 340. 1915.

Glabrous, branched; stipules thin-coriaceous, 8 mm. long; petioles stout, 5–8 mm. long; leaves obovate, obsoletely and remotely serrulate, little revolute, 8–13 cm. long, 4–6.5 cm. wide, the obscure serrations white-tipped, the 10–18 lateral nerves prominent beneath; panicles terminal, to 2 dm. long, and often with 1 or several flowers on lateral branchlets, their pedicels to 1 cm. long; bracts deciduous; sepals subequal, elliptic, concave, about 4–6 mm. long; petals about 12 mm. long, 8 mm. wide; stamens 10, smooth, the stout filaments 1 mm. long, anthers 5.5 mm. long; capsules subsessile, attenuate both ends, 3–4 cm. long, 4 mm. thick, the ellipsoid seeds 0.75 mm. long.—Shrub 1–4 meters tall, the slender branches with dark gray-brown bark. The petioled leaves with different serration and nervature and the smaller flowers distinguish the species from *G. obovata* (Ule). Type of *K. scandens* scandent with adventive roots in trees; flowers deep yellow; from Tabatinga at the boundary. Illustrated, Torreya 45: 70 (flowers, fruits). F.M. Negs. 9645; 23884.

San Martín: Tarapoto, *Spruce 4003*, type; *Williams 5988*. Cerro de Isco, 1,000 meters, *Ule 6716*. Amazonian Brazil.

CARYOCARACEAE. Souari Family

Reference: L. Williams, Trop. Woods 42: 1–18. 1935.

Erect, ligneous, with opposite or alternate digitately 3–5-foliolate leaves and hermaphrodite flowers borne in terminal ebracteate racemes. Calyx as petals 5–6, imbricate, the latter free or cohering above; stamens rather ferrugineous in 5–6 series or basally connate, the early geniculate filaments sometimes sterile, the outer always with 2-celled anthers. Ovary 4–20-celled, ovules solitary. Fruit with a ligneous muricate or spinescent endocarp finally dehiscing into 1-seeded cocci; seeds often reniform, endosperm thin, embryo with spirally twisted radicle, the small cotyledons hamately inflexed.

Souari fruits, particularly those of *Caryocar nuciferum* L. of South America, are of some economic importance as the mesocarp is rich in oil and the nuts are edible; the woods are hard and durable, useful for purposes requiring strength and resistance to dampness (Williams).

Leaves opposite; calyx deeply parted . . . . . 1. *Caryocar.*
Leaves alternate; calyx truncately dentate . . . . . 2. *Anthodiscus.*

1. CARYOCAR L.

References: Lanjouw & Van Heerdt, in Pulle, Fl. Surinam 3: 366–372. 1941; L. Williams, Trop. Woods 42: 1–18. 1935.

Trees with opposite coriaceous leaves, the leaflets often dentate, the stipules, if developed, promptly caducous. Petals free or basally subconnate with the stamens, the inner of these without anthers. Ovary 4–6-celled, the 4–6 filiform styles greatly elongate. Seeds large, subreniform, radicle fleshy, arcuate.

The edible nuts of *C. nuciferum* L. of the Guianas provide a culinary oil; for the morphology of this species with many figures see Fritz Blank, Ber. Schweiz. Bot. Ges. 49: 438–494. 1939. Williams' account, besides technical wood descriptions and economic data, contains keys without species descriptions, but with useful notes concerning habitats and dimensions. Possibly cultivated (or native?)—a nut was found by Kuhlman on the Río Branco, Brazil (Ducke)—it may be known by its large (to 8 cm. long) flowers and fruits (to 12 cm. long) covered with smooth rounded projections.

The differences observed between some of the Peruvian collections and assumed to indicate specific entities may doubtfully be found to carry that import when the trees are well-known.

Stipules persisting; stamens about 150; fruit spines 2–4 mm. long. *C. microcarpum.*

Stipules caducous or none; stamens about 300; fruit spines (known) 5–12 mm. long.

Leaflets entire or merely undulate.

Leaflets glabrous. . . . . *C. glabrum.*

Leaflets pubescent in nerve axils beneath. . . . . *C. coccineum.*

Leaflets obviously, sometimes remotely, crenulate. *C. Tessmannii.*

Caryocar coccineum Pilger, Notizbl. Bot. Gart. Berlin 10: 127. 1927.

Nearly glabrous tree, similar to *C. glabrum* but the coriaceous petiolulate leaflets with fasciculate trichomes in the axils of the nerves beneath, these prominent, about 10, peduncles about 1 cm. long, calyx (with pediform base) 1 cm. long, and petals, at least in type, scarlet, to 2.5 cm. long, the dark carmine stamens about twice as long.—Type a tree of flood-free terrain, 20 meters tall, trunk 5 dm. in diameter; *Williams 4425*, often 30 meters, small buttresses, flowers garnet to yellow, fruit 2.5 cm. thick, kernel edible,

according to Williams, who describes wood, Field Mus. Bot. 15: 332. 1936, heart wood pale reddish or russet brown. F.M. Neg. 9696.

Loreto: Mouth of the Santiago, *Tessmann 4092*, type. Fortaleza on the Huallaga, lowland, *Williams 4425*. "Almendro" (Williams).

Caryocar glabrum (Aubl.) Pers. Syn. Pl. 2: 84. 1806. *Saouari glabra* Aubl. Pl. Guian. 1: 599. *pl. 240*. 1775.

Branches scarred by the promptly deciduous lanceolate stipules, these to 3 mm. long; petioles 3–9 cm. long; stipules caducous, minute, the petiolules 2–7 mm. long; leaflets 3, oblong- sometimes ovate-elliptic, obtuse and rounded or subcordate at base, obtusely short-acuminate, 8–15 cm. long, 3.5–6 cm. wide, entire (subundulate at margins), glabrous, chartaceous or subcoriaceous; peduncles 2–6.5 cm. long, raceme axis 1–2 cm. long with usually 15–25 flowers; pedicels rather stout, 1.5–3 cm. long; calyx lobes suborbicular, fimbriate-pilose, about 4 mm. wide, 2–3 mm. long; petals 2 cm. long or somewhat longer, at least half as wide, very thick, fimbriate-denticulate; stamens about 350, the shortly united outer series 3.5–4 cm. long, the inner on annulus 5 mm. high only 1.5–2 cm. long; anthers oblong; ovary cells and styles 4, the latter 4–5 cm. long; fruits ellipsoid-globose, 5–6 cm. long, 5–8 cm. broad, 4 cm. thick (Ducke), exocarp as mesocarp thick, fleshy, outer soft reddish layer, endocarp soon deciduous and scarcely covering the ligneous sharp spines of the inner layer, these 5–12 mm. long, the subreniform (usually 1 or 2) seeds about 5 cm. long, 3–4 cm. thick, rich in oil and, according to Ducke, savory.—After Lanjouw & Van Heerdt (see for synonymy), who have followed the interpretation of Ducke, Archiv. Jard. Bot. Rio Jan. 4: 133. 1925, and Pilger, Pflanzenfam. ed. 2. 21: 90–93. 1925, in the use of Aublet's names, which is the business-like solution to the nomenclatorial problem. Usually a 20 or 35 rarely 50 meter tree with brown heartwood of flood-free woods (Ducke); Tessmann's tree was 15 meters high, trunk 58 cm. in diameter, petals pale yellow, filaments roseate; Ducke in a letter to Pilger, kindly shared with me, suggested that Río Itaya specimens were probably *C. microcarpum*, so the Tessmann material may have been an earlier determination. *C. Krukovii* Gilly, Trop. Woods 72: 17. 1942, from São Paulo and perhaps extending into Peru, has minute calyx lobes (1–1.5 mm. long), stamens and roseate petals 10 mm. long. *C. parviflorum* A. C. Smith, Journ. Arnold Arb. 20: 298. 1939, of Amazon region, has flowers only 18–25 mm. long, with filaments 3 cm. instead of about

6 as for *C. glabrum* (Smith). Illustrated, Ducke, Archiv. Jard. Bot. Rio Jan. 5: *pl. 23. fig. 55* (flower).

Loreto: Soledad, *Tessmann 5299* (det. Pilger). To the West Indies. "Almendra" (Tessmann), "piquia-rana" (Brazil).

Caryocar microcarpum Ducke, Archiv. Jard. Bot. Rio Jan. 4: 133. 1925.

Resembles *C. glabrum* but stipels persisting, stamens hardly half as many, fruit 3–4 cm. broad, the spines of unequal length, often fasciculate and only 2–4 mm. long; moreover the petals are greenish-white (as stamens) or roseate or yellow, fruit 2–3 cm. long and thick, with rather thick and fleshy exocarp, mesocarp and outer endocarp, and the 2–4 seeds 2–4 cm. long, 10–18 mm. in diameter.—A smaller tree than *C. glabrum*, wood nearly uniform, and found on inundated terrain; the leaves and bark rubbed in water produce a foam used for soap; the fruits are not edible (Ducke). Williams, Field Mus. Bot. 15: 333. 1936, describes the wood (heart-wood grayish brown) from his specimen under *C. glabrum* to which his general remarks apply in part. Illustrated, Ducke, Archiv. Jard. Bot. Rio Jan. 5: *pl. 23, fig. 56* (flower). F.M. Neg. 9699.

Loreto: Timbuchi, Río Nanay, *Williams 1000*. Mishuyacu near Iquitos, *Klug 689*. Río Mazán, *José Schunke 167* (det. Standley, *C. Tessmannii*). To Guianas. "Almendro de bajo" (Williams).

Caryocar Tessmannii Pilger, Notizbl. Bot. Gart. Berlin 10: 126. 1927. *C. amydaliforme* (sic) R. & P. ex G. Don, Gen. Syst. 1: 654. 1831. *C. amygdaliforme* (sic) R. & P. ex Walpers, Repert. Bot. 1: 410. 1842.

Glabrous, the flowers with ochre yellow petals and carmine filaments, the former 2.5– nearly 3 cm. long, the latter 5 cm. long; petioles about 1 dm. long, petiolules 7–9, or terminal to 13 mm. long; leaflets subequal, thin-coriaceous, nearly elliptic or obovate-elliptic and cuneately narrowed to base, caudate-acuminate, often 15–17 cm. long, 7 cm. wide, irregularly and remotely crenate or undulate-crenulate, the 11–13 lateral nerves prominent only beneath; stipels none; racemes 4–5 cm. long; peduncles 1-flowered, stout, 13–25 mm. long; pedicels with decurrent calyx 1 cm. long, the rounded calyx lobes ciliolate; fruit according to collector spiny, the inner part edible.—*C. amygdaliferum* Mutis of Colombia has distinctly serrate leaflets with stipels; it is probably the tree referred to the species of Mutis by Ruiz & Pavón and published, essentially as

a *nomen nudum*, under the names cited above, which, as Pilger suggests, are to be cancelled. Williams specimen doubtful; heartwood pale yellow or light brown; tree 30 meters, trunk 2 dm. in diameter, flowers red, drupe round, brown speckled, pulp rich in oil used for cooking and medicinally, kernel also edible according to Williams, who gives anatomy of wood, Field Mus. Bot. 15: 333. 1936. *C. Tessmannii*, somewhat similar to *C. pallidum* A. C. Smith of the upper Amazon, has scarlet filaments, less distinctly serrate leaves, axillary hair tufts, no stipels (Smith, Journ. Arnold. Arb. 20: 297. 1939). F.M. Neg. 9700.

San Martín: Sandy loam along forest trail, Tarapoto, *Williams 6106?* Juanjuí, *Klug 3907* (det. Standley).—Huánuco: Chicoplaya, *Ruiz & Pavón* (det. Pilger).—Loreto: Pongo de Manseriche, *Tessmann 4324*, type. "Almendra," "almendrón" (Williams).

2. ANTHODISCUS G. F. W. Meyer

Shrubs or trees with alternate leaves, the 3 leaflets entire or crenate and the flowers with short cupulate calyx, the petals cohering above and calyptrately deciduous. Stamens at least in bud annulately connate basally, all fertile. Ovary cells and styles 8–20, the latter shortly linear-filiform. Seeds small; radicle greatly elongating, spirally contorted.

Leaflets obtusely acuminate ..... *A. trifoliatus.*

Leaflets rounded apically.

Pedicels soon to 1 cm. long; leaves nearly glabrous.. *A. peruanus.*

Pedicels 5 mm. long; leaves opaque above, pilosulous beneath on nerves ..... *A. glaucescens.*

Pedicels about 1 cm. long; leaves lustrous above, pilose beneath. *A. pilosus.*

Anthodiscus glaucescens Macbr. Candollea 5: 385. 1934.

Branchlets puberulent, petioles (2–2.5 cm. long), leaf-nerves beneath and racemes sparsely pilosulous, otherwise glabrous; leaflets similar but the lateral somewhat smaller, the central to 1 dm. long, 4 cm. wide, all oblong-obovate, rounded-apiculate apically, nearly sessile or cuneate-attenuate to short petiolule, crenate-serrulate, subcoriaceous, opaque and glaucous above, paler beneath, the nerves and veins rather prominent on the surfaces; peduncles 3 cm. long; racemes densely flowered, 5 cm. long, pedicels 5 mm.

long; calyx subcoriaceous, cupulate, obsoletely or lightly crenate; flowers (immature) 7 cm. long, the thick petals glabrous; filaments before anthesis more or less incurved, strongly unequal, the longer about 5 mm. long, smooth; ovary ovoid; styles 10, erect subulate attenuate apically, about 2 mm. long.—Perhaps should be included in *A. peruanus*, but at the time described I wrote: no described species in so far as I have been able to determine is similar. The type about 2 meters high at edge of forest.

San Martín: San Roque, *Williams 7491*, type.

Anthodiscus peruanus Baillon, Adansonia 10: 241. 1872.

Rather robust tree, quite glabrous, the leaflets of the ample leaves unequal, the lateral much smaller, the middle one to about 1 dm. long, 4 cm. wide, all long-obovate or subspathulate, notably narrowed to base, obtuse, irregularly crenate and finally unevenly reticulate veined; racemes to 1.5 dm. long, the pedicels basally and conspicuously articulate; calyx subequally 5-crenate, coriaceous as the strongly imbricate petals; stamens soon separated into 5 phalanges, the solitary central one much the longer, all the anthers finally erect; ovary bordered at base with a somewhat unequal disk, cells as many as 12, the radiating style branches rather fleshy, apically glandular-stigmatose and scarcely sulcate within.—Species name as above by author; in Pflanzenfam. ed. 2. 21: 93. 1925 given as *peruvianus*, perhaps unintentionally. Tall tree of non-inundated forests, the Tessmann example 18 meters high, trunk 6 dm. in diameter, flowers bright golden yellow, fragrant. *A. amazonicus* Gleason & Smith, Brittonia 2: 156. 1936, has smaller subemarginate leaflets, pedicels not inserted in pits. F.M. Negs. 29274; 35283.

Loreto: Pongo de Manseriche, *Tessmann 4856* (det. Pilger). Without data, *Ruiz & Pavón*, type; *Rivero*. Amazonian Brazil.

Anthodiscus pilosus Ducke, Trop. Woods 90: 23. 1947.

Branchlets lenticellate, the younger as the petioles, these 4–5 cm. long, leaves beneath and racemes including the calyces densely canescent pilose; terminal petiolule 1–2 cm. long, lateral 3–10 mm. long, the terminal leaflet 7–10 cm., usually 4–6 cm. wide, the lateral rarely much smaller, all obovate, cuneately decurrent, rounded and minutely apiculate (sometimes subretuse) at apex, revolute and distinctly crenate, chartaceous, more lustrous above than beneath, the 9–12 lateral nerves and fine reticulate veins rather conspicuous; racemes 11–14 cm. long, the upper half floriferous; calyx 4–5 mm.

broad, 2–2.5 mm. high, subobsoletely 5-dentate; petals intense yellow, to 1 cm. long, oblong, nearly glabrous; stamens to 8 mm. long, filaments slightly tuberculate; ovary glabrous.—Unique in the abundant indument; discovered in a high dry forest among several species of the "caatinga" of the upper Río Negro, for example *Leptothyrsa Sprucei* (Ducke).

Loreto: In white sandy soil, San Juan Nuevo near Iquitos, (*Ducke 1855*, type).

Anthodiscus trifoliatus G. F. W. Mey. Prim. Fl. Essequeb. 194. 1818.

Glabrous tree with terete branchlets, the leaflets of the rather large leaves subequal, the flowers greenish, about a cm. across and very fragrant; petioles 2–3 cm. long, petiolules rarely 5 mm. long; leaflets oblong-lanceolate, acute, shortly attenuate to base, 6–12 cm. long, 3–5.5 cm. wide, crenate-serrate, lustrous above; racemes terminal, simple, many-flowered, the pedicels only 2 or 3 mm. long and with a pair of ovate acute thin-margined bracts below the middle; calyx obsoletely 5-lobed, to 4 mm. broad; petals green, oblong, acuminate; filaments (apparantly, ex icone) coarsely tuberculate; ovary depressed medially, the 14–20 styles compressed-subulate.—Fruit simulating that of *Malva rotundifolia* (author). Standley proposed an herbarium name after the collector for the Peruvian tree, which when better known may prove to be distinct from the type of Meyer, which was about 12 meters tall from the Río Essequibo. Illustrated, Trans. Linn. Soc. 18: *pl. 20.*

San Martín: Pongo de Cainarachi, *Klug 2682* (det. Standley with query). British Guiana.

MARCGRAVIACEAE

Scandent or epiphytic, rarely arborescent, with alternate coriaceous entire leaves (fertile stems) and terminal racemes, these often short and umbelliform, the bracts (or nectaries) more or less deformed and lobed, often sac-like. Sepals and petals 5, at least the former strongly imbricate, sometimes calyptrate and falling as a unit. Anthers basifixed. Ovary several-celled. Fruit usually indehiscent with numerous seeds; endosperm wanting, radicle slightly curved, much longer than the small cotyledons.—The German "Nektarbehälter" is a good concise name for the often bizarre foliose nectar-containing bracts.

Inflorescence in part sterile (the central flowers); sepals 4; petals calyptrately connate.....1. *Marcgravia.*

Inflorescence entirely fertile; sepals 5; petals free or basally connate.

Bracts solid or nearly, usually globose; ovary 2-celled; racemes long; stamens 5.....2. *Ruyschia.*

Bracts sac-like, with 2-parted hollow spur; ovary 5-celled; racemes rather long; stamens 5.....3. *Souroubea.*

Bracts spoon-shaped or sac-like, but not 2-parted; ovary 3–5-celled; stamens often many; flowers often subumbellate.
4. *Norantea.*

1. MARCGRAVIA L.

Racemes usually much shortened and umbelliform, the sac-like bracts in the middle of the umbels stiped, free from pedicels. Petals calyptrately deciduous as an undivided unit. Stamens 12–40, mostly lightly connate basally, free from corolla. Anthers linear. Stigmas obscurely radiate. Fruits globose, somewhat fleshy.—Leaves of creeping sterile branches often small, submembranous.

Leaves apparently veinless or nearly.

Leaves obtusish, sometimes cusped.....*M. macrocarpa.*

Leaves acuminate or distinctly acute.

Leaves eglandular or 2 glands near base beneath..*M. trinitatis.*

Leaves with about 8 glands beneath.....*M. Williamsii.*

Leaves obviously veined, at least beneath.

Leaves to about 3.5 cm. wide, subsessile.....*M. crenata.*

Leaves distinctly wider unless *M. Weberbaueri,* shortly but obviously petioled.

Leaf-veins scarcely if at all visible above.....*M. Weberbaueri.*

Leaf-veins more or less obvious both sides.

Pedicels enlarged to 3 mm. thick below flowers.
M. macrophylla.

Pedicels slender, about 2 mm. thick below flowers.

Pedicels about 2 cm. long.

Leaves often subelliptic, 1–1.5 dm. long, often nearly half as wide.....*M. parviflora.*

Leaves oblong, 2–2.5 dm. long, about a third as wide.
M. longifolia.

Pedicels about 5 cm. long.....*M. strenua.*

Marcgravia crenata Poeppig ex Wittm. in Mart. Fl. Bras. 12, pt. 1: 223. 1878. *M. polyantha* Delf. var. *occidentalis* Wittm. l.c. 224 as to Peru.

Leaves subsessile, oblong-ovate, rounded-obtuse at base, cuspidate or obtuse, 8–10 cm. long, about 3 cm. wide, membranous, nervose, marginally glandular crenate, the adult with a few patelliform glands mostly toward the apex; flowers 15–23, the slender pedicels about 3, rarely 4 cm. long, suberect, crowded; bracts shortly petiolate, erect, 4–4.5 cm. long, elongate tubular-cucullate, slightly clavate apically, the orifice obliquely open; corolla ovoid-conic, obtuse, 8 mm. high, 5 mm. thick; stamens about 30.

San Martín: Vitoc, *Ruiz & Pavón*.—Huánuco: Chihuamula and Cuchero, *Poeppig 1477*, type.—Junín: Chanchamayo Valley, *Schunke 648*.—Loreto: Caballo-Cocha, *Williams 2307*. Brazil.

Marcgravia longifolia Macbr. Candollea 5: 386. 1934.

Resembles *M. macrophylla* but leaves 2–2.5 dm. long and bracts strongly clavate but scarcely 6 mm. thick at apex, 2 cm. long; peduncles to 1.5 dm. long; pedicels about 30, sparsely rufous tuberculate, 2 cm. long, 2 mm. thick below the flower.—This and *M. strenua* may be better treated as variants of the similar species but the three forms are recognizable on characters accepted as specific elsewhere in the genus.

Loreto: Mishuyacu, near Iquitos, *Klug 924*, type; *398*.

Marcgravia macrocarpa [R. & P.] Sleumer ex Diels, Bibl. Bot. 116: 107. 1937. *M. oblongifolia* Pavón ex Wittm. in Mart. Fl. Bras. 12, pt. 1: 223. 1878, fide Diels, not *M. oblongifolia* Pavón in synonymy.

Leaves subsessile, oblong or narrowly oblong, obliquely obtuse at base, rounded-obtuse at tip, usually 8 or 9 cm. long, about 2.5 cm. wide, very heavy, notably with a series down the middle each side of midnerve of large obliquely poriform glands and sometimes a few between the margin and the series; umbels few-flowered, subsessile, the rather stout pedicels 6 cm. long; bractlets as sepals large (expanded calyx 12 mm. across), orbiculate, spreading; corolla oblong-conic, lightly umbonate, the point recurved; stamens about 32; stigma mammiform.—In the Ecuadorian specimen the stigma is subsessile as in *M. flagellaris* Poeppig, which is scarcely distinct (Diels); leaves dark green above, brighter beneath, veins invisible. Illustrated, Wittmark, l.c. *pl. 41, fig. 2* (leaf, fruit and flower).

Fruits edible, known as "Purum-hijos" from their resemblance shape and taste to figs (Ruiz & Pavón).

San Martín: Vitoc, *Ruiz (& Pavón) 1790*, type, Herb. Dahlem. —Junín: Chanchamayo, *Isern 2054*. Ecuador.

Marcgravia macrophylla (Wittm.) Gilg, Bot. Jahrb. 25: Beibl. 60: 27. 1898. *M. rectiflora* Tr. & Pl. var. *macrophylla* Wittm. in Mart. Fl. Bras. 12, pt. 1: 222. 1878.

Subterete flowering branches, pedicels and bracts often strongly tuberculate; leaves shortly petioled, oblong-elliptic, acutely cuspidate or sometimes subfalcately peduncled, almost 1.5–2 dm. long, 6–8 cm. wide, nervose, with 2 large glands toward the base and pore-like ones beneath; pedicels thick, to about 5 cm. long, two or three times longer than the straight, shortly stiped, strongly clavate bracts, these with orbicular orifice; bractlets large, sepaloid; corolla cylindric-conic; stamens 36.—Most like *M. polyantha* Delp. (Gilg). Illustrated, Wittmark, l.c. *pl. 40, fig. 2* (leaf and bract). F.M. Neg. 9725.

San Martín: Tocache, *Poeppig 2005*, type.—Loreto: Paraiso, upper Río Itaya, *Williams 3318*. Ecuador.

Marcgravia parviflora Richard ex Wittm. in Mart. Fl. Bras. 12, pt. 1: 227, *pl. 42, fig. 3*. 1878.

Branchlets densely rugulose-lenticellate; petioles 4–8 cm. long; leaves oblong-elliptic or subobovate, acute at base, shortly and obtusely acuminate, mostly about 1–1.5 dm. long, 4–6 cm. wide, coriaceous, rather lustrous especially above, glanduliferous at margin but hypophyllous glands none, the 8–12 lateral nerves prominent both sides, not obviously parallel; inflorescence umbelliform, sometimes 30-flowered, the peduncle long, the shortly stiped central bracts tubular-saccate, inflated above and with a small sterile flower; pedicels notably tuberculate, 2–2.5 cm. long, bearing the flowers perpendicularly, densely puberulent as the broad sepals, these with upturned edge; corolla typically conical-ovoid, rugulose, puberulent-pilose; stamens 11 or 12, the lanceolate anthers about as long as the flat filaments; ovary sulcate, 8-celled, the short style with broad flat stigma; fruit about 8 mm. thick, the many seeds foveolate.—The var. *macrophylla* Wittm. l.c. 228, has, for the genus, gigantic, nearly eglandular leaves, shorter peduncle enlarged at apex, bractlets free from calyx, corolla subglobose; it is known from adjacent Brazil.

Peru (probably; see note above). To French Guiana, Panama and Brazil.

Marcgravia strenua Macbr. Candollea 5: 386. 1934.

A vigorous liana similar to *M. macrophylla;* petioles stout, 5 mm. long; leaves oblong-elliptic, broadly cuneate at base, caudate-acuminate, to 1.5 dm. long, 6 cm. wide, lightly and laxly reticulate-veined both sides, subrigid-coriaceous and with 2 large glands at base; pedicels about 5 cm. long, slender, conspicuously verruculose-tuberculate; bracts unknown; ovary about 6 mm. high.—Distinguished readily from the similar species in spite of the incompleteness of the material, by the very rough long slender pedicels.

Loreto: Yurimaguas, *Williams 3809*, type; also *4536; Killip & Smith 29032*.

Marcgravia trinitatis Presl, Bot. Bemerk. 122. 1844. *M. flagellaris* Poeppig ex Gilg & Werdermann, Pflanzenfam. ed. 2. 21: 105. 1925. *M. rectiflora* Tr. & Pl. and var. *flagellaris* (Poeppig) Wittm. in Mart. Fl. Bras. 12, pt. 1: 222. 1878; *M. flagellaris* Poeppig in synonymy.

Leaves (fertile) narrowly oblong, rounded at base, gradually acuminate, (8) 11–12 cm. long, (2) 3–3.5 cm. wide (typically), nearly veinless, glandular margined, the surface glands lacking except 2 near base; umbels few-flowered, the 10 or so pedicels about 4 cm. long, the tubular-cucullate bracts clavate apically, usually shorter; sepals suborbicular; corolla calyptriform; cylindric-conical, obtuse; stamens 36–40, filaments elongate; ovary globose, 8–10-celled, the mammiform stigma obscurely lobed; fruits large, globose, with an edible pulp at maturity.—Near Leticia on the boundary Williams found a variation, apparently, with leaves 8–9.5 cm. long, 17–22 mm. wide (var. **leticiana** Macbr., comb. nov. *M. flagellaris* var. *leticiana* Macbr. Candollea 5: 387. 1934). With the carelessness I have pointed out as unnecessary my varietal name was made a part of an unpublished one; and since *M. trinitatis* Presl, 1844, is the earliest of the several species names listed by G. & W., it seems impossible, granted that this plant is distinct, to accept their listing as publication as the key character applies equally to all the species named. Therefore, particularly since Urban & Gilg in 1897 referred without question *Poeppig 2026* to *M. trinitatis*, that name sens. lat. seems the available one for our plant, which at most is probably only a variety. F.M. Neg. 32237 (Poeppig).

Loreto: Near Leticia, *Williams 3149* (type, var. *leticiana*). Yurimaguas, *Poeppig 2026* (type, *M. flagellaris*); *Williams 4397*.—Río Acre: *Ule 9612* (det. Gilg). Brazil.

Marcgravia Weberbaueri Gilg, Bot. Jahrb. 42: 124. 1908. *M. crenata* Poepp. var. *roquensis* Macbr. Candollea 5: 387. 1934.

Younger branches 2.5 mm. thick, densely lenticellate, the leaf internodes about 3 cm.; petioles 5–7 mm. long; leaves oval or oval-oblong, narrowly cuneate to base and the acute apex, 7–11 cm. long, nearly 3 or 4–5 cm. wide, opaque both sides, the many parallel lateral nerves long percurrent near the margin, inconspicuous above, slightly so beneath, with many small glands generally scattered and a few larger ones at the margin; rachis 6 or 7 mm. long, with about 30 flowers, the densely transversely rugose pedicels 2.2–2.4 cm. long; 5 green bracts at apex of rachis, about 7 mm. long, stiped, long-tubular, 3–4 cm. long, at apex 7–8 mm. thick, below apex 4 mm. thick, the rotund enlarged throat about 8 mm. across; buds oblong, 7 mm. long, 4–5 mm. thick; sepals about 3 mm. wide, only 1 mm. long.—Elegant distinct species allied to *M. umbellata* L. (author). F.M. Neg. 9735.

San Martín: Near Moyobamba, 1,300 meters, *Weberbauer 4667*, type; 289. San Roque, *Williams 7388* (type, *M. crenata* var. *roquensis*).

Marcgravia Williamsii Macbr. Candollea 5: 386. 1934.

Petioles 3–4 mm. long; leaves oblong or oblong-elliptic, rounded at base, nearly caudate-acuminate (acumen to 1.5 cm. long), mostly about 1 dm. long, 3 cm. wide, subcoriaceous, seemingly quite veinless, entire but strongly undulate margined and with only about 8 punctiform glands beneath; pedicels 2–2.5 cm. long, little enlarged below the flowers; bracts to 7.5 cm. long, narrowly tubular-cucullate, little incurved apically, rather clavate, orifice suborbicular, marginally expanded with subapical sterile flower; corolla ovoid-rotund.—Comparable and related to *M. Eichleriana* Wittm. because of the extended rachis that characterizes that species and *M. coriacea* Vahl but remarkable in the length of the bracts. Except for these, in general aspect suggestive of *M. crenata* (with longer pedicels) and *M. Weberbaueri*. Rare vine, darker inner bark deep chocolate brown, branches pendent from tall trees, according to Williams, who gives wood anatomy, Field Mus. Bot. 15: 334. 1936.

Loreto: Forest of Paraiso, Alto Río Itaya, *Williams 3209*, type. "Murcuhuasca" (Williams).

2. RUYSCHIA Jacq.

Much like *Norantea* but petals always slightly connate at base, stamens 5, the anthers affixed dorsally, ovary 2-celled and bracts 3-lobed, adnate to pedicels, globose or rather (rarely) spoon-shaped but always nearly or quite solid, and fruits dehiscent.

Ruyschia sphaeradenia Delpino, Atti Soc. Ital. Sci. Nat. Milano 12: 180, 195. 1869; Nuovo Giorn. Bot. Ital. 1: 257. 1869.

Slender flowering branchlets greenish-gray; petioles 5–10 mm. long; leaves oblong or obovate, attenuate to base, subemarginate and minutely mucronulate, 5–8 cm. long, 2–3 cm. wide, with numerous seriate glands toward the subvalvate margin; racemes elongate, many-flowered, pedicels slender, 7–10 mm. long; bracts inserted about medially, pendulous, 1–2 mm. thick; subsessile, globose; buds globose-cylindrical, petals oblong; ovary subglobose after anthesis, 2-celled.—The flowers exhale a very agreeable fragrance (Ruiz & Pavón). My collection was from a scrub-tree in rocks. Illustrated, Mart. Fl. Bras. 12, pt. 1. *pl. 49, fig. 2.* F.M. Neg. 9717.

Cajamarca: Cutervo, *Raimondi.*—Huánuco: Chaglla, *Ruiz & Pavón,* type. Yanano, *3776.*

3. SOUROUBEA Aublet

Habit and foliage as in other genera but flowers racemose, bracts 3-partite, the middle lobe narrow, hollow, the lateral more or less parallel with the pedicel. Bractlets simulating outer sepals. Petals more or less connate basally, reflexing in anthesis and deciduous as a unit. Stamens 5, joined to petals at base; anthers affixed dorsally. Ovary 4–6-celled, the sessile peltate stigma 4–6-lobed. Fruits globose, seeds few.

Pedicels slender, 1– scarcely 2 mm. thick medially; leaf-nerves slender, completely obvious beneath, rarely faint. . *S. guianensis.*

Pedicels stout, at least 2 mm. thick even in flower medially; leaf-nerves if obvious beneath often incompletely and coarse.

Glands in part seriate; nerves scarcely prominent. *S. suaveolens, S. didyma.*

Glands all scattered; nerves prominent beneath. . *S. pachyphylla.*

Souroubea didyma [Poeppig] Gilg, Bot. Jahrb. 25: Beibl. 60: 33. 1898. *S. crassipes* (Tr. & Pl.) Wittm. var. *didyma* [Poeppig] Wittm. in Mart. Fl. Bras. 12, pt. 1: 254. 1878.

Leaves oval-obovate or often broadly obovate, rounded at both ends or shortly apiculate at tip, thick-coriaceous, the nerves both sides scarcely obvious, 8–12 cm. long, 3–5 (–7) cm. wide; pedicels very thick, the flowers large and the 3-parted bracts small, the spur short, thick, spreading, the wing rather fleshy, lanceolate, rounded. —Illustrated, Wittmark, l.c. *pl. 51, fig. 3.* F.M. Negs. 9719; 32235.

Huánuco: Pampayacu, *Kanehira 193; 198.* Near Cuchero, *Poeppig,* type.—Loreto: Puerto Meléndez, *Tessmann 4747* (det. Gilg, affine).

Souroubea guianensis Aublet, Pl. Guian. 1: 244. *pl. 97.* 1775.

Epiphytic or climbing, sometimes a shrub or small tree; petioles 4–8 mm. long; leaves more or less obovate, usually somewhat oblique toward the cuneate or slightly rounded base, the rounded or obtuse apex mucronate, ordinarily about a dm. long, half as wide, typically lighter colored and rough above with a few hypophyllous glands scattered more or less remotely from the margin, the fine lateral nerves obscure above, obvious beneath; racemes a dm. or two long, many-flowered, the rachis stout; bracts borne at tip of the long (typically 1.5–2 cm., –4 cm. in fruit) pedicels, red, 3–parted, the middle lobe a hollow narrow sac-like spur about 1 cm. long, clavate at tip, the lateral lobes lanceolate-spathulate with upturned margins, early recurved, later paralleling the pedicel; sepals suborbicular, about 3 mm. long, 4 mm. wide, ciliolate; petals connate nearly medially, obtuse, fleshy, yellow or orange, 8–9 mm. long; fruits rugulose, 5-ridged, 5-celled; seeds arcuate, linear, 3–5 mm. long.—*Tessmann 4560* with very broad subrotund leaves was designated in herb. as a variety by Gilg. Illustrated, Mart. Fl. Bras. 12, pt. 1: *pl. 50.*

Huánuco: Cayumba, *Mexia 8310* (det. Standley).—Loreto: Yurimaguas, *Poeppig 2879.* Puerto Meléndez, *Tessmann 4798; 4560.* Río Mazán, *José Schunke 20* (det. Standley).—Puno: Tatanara, *Lechler 2659; Gay.* To the Guianas and Central America. "Laupo" (Mexia).

Souroubea pachyphylla Gilg, Bot. Jahrb. 25: Beibl. 60: 33. 1898.

Allied to *S. didyma* Gilg; petioles 7–9 mm. long; leaves broadly obovate, narrowed to the thick petiole, rounded or shortly apiculate, about 14 cm. long and half as wide, rigid coriaceous, opaque both sides, the strictly parallel nerves prominent beneath, veins incon-

spicuous, small glands unevenly dispersed; racemes to 1.5 dm. long, the pedicels 13–14 mm. long, 2 mm. thick, glabrous; bracts 12–13 mm. long, 3-parted, the bifurcate fleshy base 5 mm. long, 2–2.5 mm. wide, the spur 7–8 mm. long, 2.5 mm. thick at tip; sepals about 3 mm. across; petals forming bud 7–8 mm. high, 5 mm. thick.—F.M. Neg. 9720.

San Martín: Shrub formation near Moyobamba, *Weberbauer 4636;* 289. Tarapoto, *Spruce 4469*, type; *Ule 6320* (det. Pilger). San Roque, *Williams 7011*.

Souroubea suaveolens Gilg, Bot. Jahrb. 42: 128. 1908.

A 3 meter shrub, the brown 4–5 mm. thick branches with a readily exfoliating whitish bark; petioles 7–8 mm. long; leaves broadly obovate, rounded at tip, cuneate to base, 10–14 cm. long, 4–8 cm. wide, rigid coriaceous, opaque both sides, with a nearly regular series of broad open glands about 2 cm. from the midrib and some others scattered; lateral nerves many, about 2 mm. from the margin, joined, only beneath prominent, the veins not at all; racemes terminal, lax, 9–11-flowered, rachis 4–7 cm. long, pedicels 3 cm. long; bracts below the flowers, green, then dull yellow, finally brunnescent, spur 7–8 mm. long, 3 mm. thick, the alate parts about as long, lanceolate, acute; bractlets sepaloid, the sepals themselves 4 mm. long, 5 mm. wide; buds obovoid, rounded, dull yellowish color, 9 mm. long, 6 mm. thick.—Beautiful species affine *S. pachyphylla* (author). F.M. Neg. 9721.

Huánuco: Near Monzón, 1,600 meters, *Weberbauer 3508*, type; 255.

4. NORANTEA Aublet

Reference: Gilg & Werdermann, Pflanzenfam. ed. 2. 21: 100–101. 1925.

Racemes terminal, elongate. Bracts connate to base or middle of pedicels, cucullate or sac-like. Petals lightly cohering basally or free. Anthers linear or oblong. Ovary 3–5-celled, the sessile stigma 3–5-radiate. Fruit fleshy-coriaceous.—Since the Museum specimens of this group were lent abroad, without advising me until just before completing this number, it has been impossible, without delaying publication unduly, to revise my tentative synopsis compiled many years ago, or to ask the borrower to contribute the genus. However, the few Peruvian species have been clearly discriminated by Gilg and Werdermann, l.c. and in acknowledging my indebted-

ness I record my pleasant remembrances of two personalities, gracious as able.

Omitted as essentially *nomina nuda* are *N. cordachida* G. Don and *N. obovata* (R. & P.) G. Don, Gen. Syst. 1: 625. 1831.

Bracts mostly sessile.

Bracts cylindrical, the length several times exceeding the diameter.

Inflorescence more or less clustered.

Pedicels about 5 mm. thick.....*N. macroscypha.*

Pedicels slender.

Leaf glands in 4 irregular series.....*N. sandiensis.*

Leaf glands in 2 series.....*N. Eoetvoesorum.*

Inflorescence umbelliform.

Leaves broadly obovate with 1 row each side of midrib of open glands.....*N. Pardoana.*

Leaves about oblong, with seriate glands near margin or scattered.

Glands few, 1-seriate.

Leaves scarcely acuminate.....*N. pedunculariis.*

Leaves acuminate.....*N. curva.*

Glands many, scattered.....*N. Uleana.*

Bracts not or scarcely longer than thick.....*N. magnifica.*

Bracts mostly long-stiped (unless in *N. anomala*).

Flowers sessile.

Inflorescence leaves to 9 dm. long, lateral nerves prominent. *N. cacabifera.*

Inflorescence leaves smaller, lateral nerves inconspicuous. *N. anomala.*

Flowers shortly pedicellate.

Bracts at pedicel base; petioles short.....*N. haematoscypha.*

Bracts above the middle; petioles elongate.....*N. japurensis.*

Norantea anomala HBK. Nov. Gen. & Sp. 7: 218. *pl. 647*bis. 1825.

Shrubby, with oblong or more or less obovate or lanceolate leaves 6–10 cm. long, scarcely 3 cm. wide (petioles to 1 cm. long), shortly acuminate or obtuse, with numerous small glands and a few large open ones; spikes or racemes to 3 dm. long, the flowers sessile

or subsessile; bracts hemispheric-galeate, subsessile or usually stiped, above base of pedicel or below flower, 10–12 mm. long (including stipe); corolla to 2.5 mm. in diameter; stamens 5–10, the anthers cordate; ovary 3-celled.—Illustrated, Mart. Fl. Bras. 12, pt. 1: *pl. 48, fig. 3* (bract and flowers).

Peru (probably). Bolivia; Ecuador to Central America.

Norantea cacabifera [R. & P.] G. Don, Gen. Syst. 1: 625. 1831. *N. Caccabion* Delp. Atti Soc. Ital. Sci. Nat. Milano 12: 182, 205. 1869; fide Wittmark.

Striking by the large oblong leaves, to 2 dm. long, 7 or 8 cm. wide, prominently nerved and almost eglandular (petioles 1–1.5 cm. long), and the sphaeroid-obovoid much inflated bracts, rather obliquely pyriform, 7–11 mm. long, 5–8 mm. thick, on slender stipes 6–11 mm. long, the aperture linear-oblong; flowers sessile, rather large; stamens 6–8, the anthers ovate-cordate; ovary globose, ovules few.—Illustrated, Mart. Fl. Bras. 12, pt. 1: *pl. 47, fig. 2* (bracts and anthers).

Peru (probably). Adjacent Ecuador.

Norantea curva Macbr. Candollea 5: 385. 1934.

Resembles *N. peduncularis;* branchlets flexuose; leaves oblong- or elliptic-lanceolate, acute or obtusely acuminate, about 13 cm. long, 3–4.5 cm. wide, flexible but chartaceous-coriaceous; glands mostly seriate and about 5 mm. distant or some approximate; pedicels flexuose, slender, 5.5 cm. long; bracts 1.5–2 cm. long; calyx scarcely 5 mm. high; flowers subovoid, exserted 5 mm.—Except as noted apparently very much like *N. peduncularis* with obovate-oblong thicker leaves, little if at all pointed, stouter pedicels, larger calyx; the somewhat similar *N. Uleana* has tapering leaves with much more approximate glands.

San Martín: San Roque, *Williams 6999*, type; also *7480*.

Norantea Eoetvoesorum Richter ex Gilg & Werderm. Pflanzenfam. ed. 2. 21: 101. 1925.

Branches terete, 4–5 mm. thick, the canescent-brown bark not exfoliating; petioles stout, 4–5 mm. long; leaves ovate-oblong, unequally cuneate to base or more or less rounded on one side, narrowed to the rounded, obtusish or retuse apex, to 14 cm. long, 5 cm. wide, coriaceous, green or brownish above, cinnamon-brownish and the lateral nerves prominent beneath, the veins obscure on both

opaque surfaces; glands 0.4–0.7 mm. broad, subseriate; racemes terminal, dense, about 14-flowered, the stout pedicels 3 cm. long; bracts 4–5 mm. stiped, narrowly tubular, 12–14 mm. long, 4–5 mm. broad; sepals orbicular, entire and subscarious, 4–10 mm. wide; buds subglobose.—Named for the family Eötvös, Hungarian scientists.

San Martín: Vitoc, *Ruiz & Pavón*, type.

Norantea haematoscypha Gilg, Bot. Jahrb. 42: 127. 1908.

Branches unequally striolate, 3 mm. thick; petioles 5 mm. long, merging into the basally attenuate oblanceolate leaves, their apex subrounded but acutely and minutely apiculate, mostly 5–7 cm. long, to 17 mm. wide, with a few rather large glands on the upper part obsoletely seriate, 2–3 mm. from the margin, the lateral nerves rather obvious only beneath; racemes 10–14 cm. long, subspicate, very dense, the spreading or subevolute pedicels 5–7 mm. long, the bracts at base on stipes 17 mm. long, cochleate, blood-red, 8 or 9 mm. long, 5 mm. thick, the orifice little enlarged; bractlets ovate, a little below the calyx; sepals 3–4 mm. wide; buds rounded, 5–6 mm. long, 3 mm. thick, green.—Elegant species allied to *N. oxystylis* Baillon (Gilg). F.M. Neg. 9706.

Puno: Shrub formation, Sandía, 2,200 meters, *Weberbauer 1057*, type; 237; *Metcalf 30590* (det. Leonard). Sandía to Chunchusmayo, *Weberbauer 1156;* 242.

Norantea japurensis Mart. Nov. Gen. & Sp. 3: 179. *pl. 295.* 1832.

Well-marked by the large obovate or oblong leaves decurrent at base into petioles 2–2.5 cm. long, the blades 1–1.5 dm. long, 5–6 cm. wide, glands few, lateral nerves and veins weak; racemes dense, subsecund, often several dm. (to 1 meter) long; bracts ample, often roseate, ovoid or obovoid, 12–17 mm. long, 8 mm. in diameter, borne above the middle of the 4–5 mm. long pedicels on stipes 5–8 mm. long, the aperture oblong; corolla only 3 mm. in diameter; stamens about 30; ovary ovoid.

Peru (probably). Upper Amazonian Brazil. "Juri" (Martius).

Norantea macroscypha Gilg, Bot. Jahrb. 25: Beibl. 60: 31. 1898.

Flowering branches extremely thick or subfleshy; petioles about 5 mm. long and thick; leaves obovate, rounded both ends, the apex

apparently always emarginate, 12–16 cm. long, 5–9 cm. wide, midnerve little prominent both sides, secondary nerves few, immersed above, obvious beneath, veins not at all, the numerous mostly small or minute glands subparallelly seriate at margin; racemes elongate, the pedicels 4.5–5.5 cm. long, 6–8 mm. thick, erect-spreading; bracts sessile, pendulous on lower third of pedicel, 5 cm. long, medially 7 or 8 mm. thick, the orifice as wide, narrowed to both ends; sepals 11–13 mm. long, 14–15 mm. broad.—Affine probably *N. pedunculariis;* perhaps *N. obovata* (R. & P.) G. Don or *N. macrocarpa* (R. & P.) G. Don but those with mucronulate leaves and descriptions quite lacking in characterization (author); actually the former is the earlier name and the latter is *Marcgravia macrocarpa.*

Huánuco: Chacahuasi, *Ruiz & Pavón,* type. "Purumhigo."

Norantea magnifica Gilg, Bot. Jahrb. 42: 127. 1908.

Branches 4 mm. thick, striate; leaves obovate-oblong, long-narrowed to subsessile base (or very short broad petiole), rounded at apex but this acutely apiculate, opaque, rigid-coriaceous, 9–11 cm. long, 3–5 cm. wide, the large open glands on the upper part often obsoletely seriate, about 1 cm. from margin, the lateral nerves and veins inconspicuous; racemes thyrsoid, 10–12 cm. long, pedicels 4–5 cm. long, gradually enlarged above, erect-spreading; bracts ferrugineous on lower quarter of pedicel, suberect, galeate, about 3 mm. stiped, 7 or 8 mm. long, 4 mm. thick; sepals 6–7 mm. long, about as wide; buds 9–11 mm. long, 8 mm. thick, green.—Beautiful 2 meter shrub affine *N. brasiliensis* Choisy and *N. costaricensis* Gilg (author). F.M. Neg. 9708.

Huánuco: Near Monzón, 2,000 meters, *Weberbauer 3528,* type; 255.

Norantea Pardoana Weberb. & Gilg, Bot. Jahrb. 42: 125. 1908.

Branches 3 mm. thick, the pale papyraceous bark exfoliating unequally, the leaves 6 or 7 mm. distant, obovate, cuneately narrowed to the petiole, this to 3 mm. long and nearly as wide, rounded at apex, 5–8 cm. long, 2.5–4 cm. wide, opaque both sides, sometimes rigid, glands and nerves obvious as in *N. sandiensis;* rachis scarcely 1 cm. long, 5–8-flowered, the erect pedicels 4.5–5 cm. long; bracts tubular-saccate on lower third of pedicels (stipes 3 mm. long), little enlarged above, 6 mm. thick, 2.5–3.5 cm. long, the suborbicular orifice about 6 mm. across; sepals 6 mm. broad; buds 8–9 mm. long,

5–6 mm. broad, the oblong petals greenish; fruits smooth, about 12 mm. thick, 9 mm. high, the persisting style 1 mm. long.—A 2 meter shrub apparently allied to *N. mixta* Tr. & Pl. and *N. macrostoma* Gilg (authors); commemorates a president of Peru who aided the earlier collecting of the senior author.

Junín: Above Huacapistana toward Palca, 1,900 meters, *Weberbauer 1976*, type; 247.

Norantea peduncularis Poeppig ex Wittm. in Mart. Fl. Bras. 12, pt. 1: 238. 1878.

Flowering branches stout; petioles 4–5 mm. long; leaves obovate-oblong or oblong, obtusish at base, rounded-subemarginate, 7–8 cm. long, 3–3.5 cm. wide, heavy coriaceous, with 8–10 sometimes seriate glands; umbellate pedicels to 13, erect-arcuate, about 6 cm. long, 1.5–2 mm. thick; bracts pendulous, tubular-saccate, ventrally somewhat incurved, the large orifice nearly orbicular, the free part sublingulate, 2.5 cm. long, 5 or 6 mm. across, the spurs sessile; bractlets appressed, sepaloid; corolla drying yellowish; petals strongly imbricate, oblong, the outer narrower; stamens about 25, anthers linear; ovary 6-celled, style stout, stigma indistinctly lobed.

Peru: *Poeppig 1478*. Colombia.

Norantea sandiensis Gilg, Bot. Jahrb. 42: 126. 1908.

Older branches whitish, smooth, unequally angled, the leaf internodes 1.5–2 cm. long; leaves obovate or obovate-oblong, cuneately narrowed to the very broad petiole, this about 5 mm. long, rounded or often retuse, 7–10 cm. long, 2.5–4 cm. wide, sometimes rigid-coriaceous and with many lenticelliform glands mostly in 2 series about 1 cm. from the margin, lateral nerves mostly obscure both sides; racemes 1.5–2 cm. long, 3–8-flowered; pedicels erect, 5–6 cm. long; bracts green below, reddish brown above, tubular-saccate, clavately enlarged, 1–2 mm. long-stipitate, 5–7 mm. thick at apex, 4–4.5 cm. long, the suborbicular orifice about 1 cm. across; sepals 7–8 mm. in diameter; buds globose-ovoid, 10–12 mm. long, 7–8 mm. thick, broadly rounded; corolla large, the green petals strongly imbricate.

Puno: Open shrub-formation, Azalaya, Sandía to Chunchusmayo, 1,500 meters, *Weberbauer 1343*, type; 278. Sandía, *Raimondi*. "Alchuyhuaturo" (Raimondi).

Norantea Uleana Pilger, Verh. Bot. Ver. Brandenb. 47: 155. 1905.

Flowering branchlets and subsessile leaves fleshy coriaceous, the latter elliptic, little oblique at base, obtuse and shortly subcuspidate, 10–11 cm. long, 3.5–4.5 cm. wide, the nerves lightly impressed above, beneath rather prominent, the lateral fine and borne at an acute angle, the small but well-marked glands crowded toward the margins; flowers greenish, congested, subumbellate, peduncle nearly none, pedicels about 16, around 6 cm. long; bracts on the lower third of the pedicels, curved, reflexed, clavately enlarged apically, 3 cm. long, the orifice wide; sepals and petals fleshy, the first broadly rounded, the second obovate-elliptic, obtuse, 12 mm. long, half as wide, stamens about 30.—Related to *N. pedunculariis* Poeppig with more obovate-oblong leaves, broader at apex, coarser nerves (author). F.M. Neg. 9715.

Loreto: Cumbaso, *Ule 6336*, type.

QUIINACEAE

Smooth shrubs or small trees closely resembling the Guttiferae but the entire or dentate sometimes pinnate leaves stipulate often conspicuously, free styles filiform, ovary cells biovulate, fruit indehiscent, berry-like, the cotyledons distinct, thick or thin, the radicle minute.

Sepals at least lightly adnate at base; leaves multipinnate, with crystal sclereids (Foster) . . . . . 1. *Touroulia.*

Sepals quite free; leaves unless the younger simple, crystal sclereids none (Foster).

Leaves usually opposite; ovary 1–3-celled, styles 2 . . . . . 3. *Quiina.*

Leaves always verticillate (Peru); ovary 6–12-celled, styles several. 2. *Lacunaria.*

1. TOUROULIA Aublet

Trees, the imparipinnate leaves opposite, the stipules interpetiolate, and male or hermaphrodite flowers in terminal racemose or paniculate cymes. Calyx lobes of male flowers imbricate, the 5 petals contorted, the stamens numerous; female sepals united only at base, petals 5 or more; ovary 7–8-celled (styles 7 or 8) with 1–2 ovules in each cell. Fruit baccate, striate, 7-celled, with as many villous or tomentose seeds.—*Froesia* Pires, Bol. Técn. Inst. Agron. Norte, Belém 15: 22–25. 1948, has the divided leaves of this genus but free sepals, fruit of 3 follicles, glabrous seeds, collected as near

Peru as São Paulo de Olivença; the parallel lateral nerves of the 13–15 leaflets are rib-like on the lower surface.

Adriance S. Foster, Amer. Journ. Bot. 37: 848–862. 1950, has studied the venation of *Touroulia* and *Froesia* Pires, showing the retention of the patterns of seedling leaf-venation in the terminal part of adult leaflets of the former genus and the presence of crystaliferous sclereids in both genera (lacking otherwise in this family) similar to those in the Ochnaceae and certain Linaceae.

Touroulia amazonica Pires & Foster, Bol. Técn. Inst. Agron. Norte, Belém 20: 49. 1950.

Small tree, the terete branches glabrescent, the branchlets and inflorescences reddish tomentose including the sepals without; leaves 2–5 dm. long, 13–17-foliolate, the petioles 5–15 cm. long, petiolules 2 mm. long, the stipules 2, subulate, 3–5 mm. long; leaflets oblong-lanceolate, obtuse or lightly attenuate at base, acuminate, obscurely glandular-serrulate (with lens), coriaceous, the lateral nerves about 20, acutely prominent beneath, the undulate veins subparallel; sepals unequal, 5–6 mm. long, obtuse or rounded; petals persisting, not resinous, glabrous, 10–12 mm. long, 5 mm. wide; stamens about 50; fruiting (hermaphrodite) inflorescence 9 cm. long, pedicels (not articulate) 6–8 mm. long; fruits (immature) globose, 11 mm. long, 9 mm. thick, 8-celled, 8-styled, the seeds rusty tomentose.—Differs from *T. guianensis* Aubl. in the larger hermaphrodite flowers, persisting not resinous petals, leaflets coriaceous and veined as in species of *Froesia*, that is, directly cross-paralleled between the lateral nerves (authors). Type an 8 meter tree with trunk diameter of 5 cm. Found near Peru, as São Paulo de Olivença. Illustrated, Pires & Foster, l.c. *pls. 12* (plant), *13, 14* (leaf venation).

Peru (probably). Amazonian Brazil.

2. LACUNARIA Ducke

Reference: Ducke, Archiv. Inst. Biol. Veg. Rio Jan. 2: 169-171. 1935.

Trees with simple verticillate (in Peru) glabrous leaves and rather large dioecious flowers in often slightly compound racemes that are solitary or 2–3 in the axils. Sepals as petals imbricate, the former 4, the latter 4–8. Stamens 20–40 or 70–170; ovary undeveloped in male flowers. Ovary 6–12-celled, the styles as many as

the 2–3-ovulate cells. Fruit a 6–12-celled berry with well-developed pericarpal cavities; seeds 1–3 in each cell with thin cotyledons, copious endosperm.—See A. S. Foster, Bull. Torrey Club 78: 382–400. 1951, for an important contribution to an understanding of the "Heterophylly and Foliar Venation in *Lacunaria*," in which he shows that early leaves of seedlings in two species are deeply pinnatifid and traces the transition (and venation) to the simple mature leaves. Ducke's work consists of a key which, however, includes ranges as well as considerable characterization in contrasting clearly each species and this with my appreciation is summarized here.

Petals 8 (7); stamens about 100; leaves with 30–40 secondary nerves, puberulent beneath..... *L. pulchrinervis.*

Petals 4 or 5; stamens about 35 or fewer (known); leaves glabrous, secondary nerves 8–25.

Secondary nerves 8–12..... *L. acreana.*

Secondary nerves 15–25..... *L. Jenmani.*

Lacunaria acreana Ducke, Archiv. Jard. Bot. Rio Jan. 4: 141. 1925.

Glabrous unless the branchlet tips and the racemes, these rufo- or ferrugineous tomentose including the orbicular outer sepals; stipules linear-subulate, acuminate or setaceous, 0.5–1.5 cm. long; petioles 1.5–2 cm. long or longer; leaves oblong, rarely somewhat obovate, long-attenuate to base, obtuse or more or less and shortly acuminate, 1–2 dm. long, 4–6 cm. wide, subcoriaceous, the 9–12 slender nerves rather prominent beneath; male inflorescence unknown; rachis to 2 cm. long, pedicels finally often deflexed, to 2 cm. long; sepals 4, 4–5 mm. long, inner more elliptic, 7 mm. long, tomentose only at base; petals whitish, 4–5, obovate-orbicular, 6 mm. long; ovary strongly striolate, cells as styles 12, ovules 2.—Type 5–6 meters high. Close to or possibly conspecific with *L. macrostachya* (Tul.) A. C. Smith, Trop. Woods 58: 31. 1939, from the Solimões region (not Peru, Tulasne, Ann. Sci. Nat. sér. 3. 11: 162. 1849). To be expected in Peru, as also *L. coriacea* A. C. Smith, l.c., with somewhat smaller leaves, pedicels (male) 4–5 mm. long. F.M. Neg. 9755. Illustrated, Mart. Fl. Bras. 12, pt. 1: *pl. 110* (*Quiina macrostachya*).

Río Acre: Nova Olinda to São Luiz, (*Kuhlmann*, type, Herb. Jard. Bot. Rio Jan.).

Lacunaria Jenmani (Oliver) Ducke, Archiv. Jard. Bot. Rio Jan. 5: 171. 1930. *Touroulia Jenmani* Oliver in Hook. Icon. *pl. 1998.* 1891.

Branchlets and petioles (to 4 cm. long) early rufous puberulent, becoming glabrate; stipules linear-subulate, rigid, to 1 cm. long; leaves more or less obovate or oblong-elliptic, cuneate or acutely narrowed at base, acutely or subobtusely short-acuminate, often 1.5–3 dm. long, 5(4)–10(12) cm. wide, rarely remotely denticulate, coriaceous, somewhat lustrous, the 15–25 lateral nerves notably prominent only beneath; inflorescences rufous tomentose compound racemes, often about 1.5 dm. long, with short verticillate lateral branchlets, the male more densely flowered, the pedicels only 4–5 mm. long, the female pedicels 1–2.5 cm. long, accrescent in fruit; sepals 4, concave, the 2 interior to 5 mm. long, sparsely pilose marginally toward tip (male) or to 7 mm. long, sparsely pilose (female); petals 5–7, obovate-oblong, 5 and 8 (female) mm. long; stamens 20–35, slender filaments 3–6 mm. long, anthers subglobose; ovary subcylindric, sulcate, cells as styles 10–13, the latter 2 mm. long, broadened into the plumose stigmas; fruit key-shaped or subglobose, to 12 cm. long, 9 cm. thick, the pericarp 12 mm. thick with as many cavities as fissures in the resiniferous exocarp; seeds 3 to a cell, ovoid, 1–1.5 cm. long, covered with long rufous pubescence.

Loreto: Iquitos (fide Ducke). Amazonian Brazil.

Lacunaria pulchrinervis Ducke, Archiv. Inst. Biol. Veg. Rio Jan. 2: 169. 1935.

Small tree, the slender branchlets, conspicuous secondary parallel leaf nerves beneath (33–43) and racemiform male inflorescence (female unknown) reddish puberulent or tomentulose; petioles 4–6 cm. long; leaves 2.5–4 dm. long, 9–15 cm. wide, lanceolate elliptic or oblong-obovate, attenuate to petiole or obtuse basally, shortly acuminate, subentire, coriaceous, subconcolorous but rather bright deep green between the nerves beneath; verticils of 1–2 flowers, the pedicels to 3 cm. long; sepals 4, coriaceous, 5–6 mm. long; petals 8, white, strongly reflexed after anthesis, to 1.5 cm. long, 8–11 mm. wide, distinctly nerved, glabrous except ciliate margined but notably lustrous with a resinous substance; stamens white, 105–110 (counted in 3 flowers).—After author, who compared it with *L. grandiflora* Ducke of the Río Negro with opaque narrower petals. Since the

type (one collection by Ducke) was from São Paulo de Olivença, Brazil, the species in all probability is also within Peru.

Peru (probably). Amazonian Brazil.

3. QUIINA Aublet

Leaves opposite or rarely verticillate, often elegantly and finely lined by the transverse veins between the pinnate nerves. Stipules narrow, rigid, often geminate. Flowers polygamo-dioecious, small, disposed in short axillary panicles or terminal racemiform or divaricate-racemose inflorescences or fascicles. Sepals and petals 4 or 5 or the latter 8, both imbricate. Stamens many, connate only at base if at all; filaments filiform, anthers small, oblong or globose-didymous. Ovary 2–3-celled with as many apically stigmatose distinct styles; ovules ascending. Fruit baccate, the endocarp fulvous, the 2–4 ovoid or globose seeds tomentose, the cotyledons thick.—Ducke, Archiv. Jard. Bot. Rio Jan. 5: 172. 1930, pointed out that most if not all species are polygamo-dioecious and therefore, as noted by A. C. Smith, Trop. Woods 58: 25. 1939, the primary divisions of the keys of Tulasne and Engler are not dependable. As usual, it has been impossible to consider more than in a general way the extra-Peruvian species that may be found to antedate some described from Peru which will be disclosed only by a revision of the group.

Leaves verticillate, long-spatulate, those of new shoots pinnatifid. *Q. pteridophylla.*

Leaves opposite, all entire or not pinnatifid.

Inflorescences sessile; pedicels to 1 cm. long, leaves to 4 dm. long. *Q. grandifolia.*

Inflorescences not sessile; pedicels and leaves shorter.

Inflorescences many-flowered, crowded with the subequal stipules. . . . . *Q. Tessmannii.*

Inflorescences elongating or reduced to 1–few flowers.

Leaves abruptly caudate, the acumen 1–2 cm. long, 1–3 mm. wide. . . . . *Q. amazonica.*

Leaves if acuminate not caudate as above.

Principal lateral nerves often to 15 or more subequally marked and distant.

Leaves narrowed to base; flowers small. . . . *Q. peruviana.*

Leaves rounded to acute base; flowers 5–6 mm. long. *Q. Klugii.*

Principal lateral nerves often about 10 or in any case unequally marked and distant.

Leaves glabrous.

Leaves very lustrous above, about elliptic. . . *Q. nitens.*

Leaves slightly lustrous, ovate- or oblong-lanceolate. *Q. rhytidopus.*

Leaves puberulent beneath, mostly even in age. *Q. pubescens.*

Quiina amazonica A. C. Smith, Trop. Woods 58: 27. 1939.

Glabrous except sometimes the branchlet tips, petioles (2–5 mm. long) and sepals a little puberulent, the leaves slenderly caudate-acuminate, the slender inflorescences hermaphrodite, usually 2.5–5 cm. long; stipules subulate-setaceous, 3–5 mm. long; leaves elliptic, acute, obtuse or rounded at base, the abrupt acumen obtuse or subacute, 1–2 cm. long, 1–3 mm. wide, obscurely if at all crenate, chartaceous, 6–14 cm. long, 2.5–5.5 cm. wide, the 9–12 lateral nerves acute elevated above, very conspicuous as the veins beneath; flowers mostly solitary, pedicels 4–5 mm. long, articulate toward the little enlarged base; sepals 3 or 4; deltoid-ovate or suborbicular, about 1 mm. wide; petals 3–6, membranous, entire, 1.5–1.7 mm. long and wide; stamens about 9, uniseriate, styles 2, little longer than ovary (male inflorescences and flowers similar to above description but ovary none, stamens 15–17 fasciculate); fruits obscurely striate, 11–21 mm. long, 7–12 mm. wide, mucronulate, the oblong-ellipsoid seeds minutely villosulous, 4–10 mm. long, 3–5 mm. broad.—Allied to *Q. Poeppigiana* Tul.; not uncommon in the upper Amazon Basin.

Loreto: Sierra del Pongo, *Mexia 6269* (det. Pires; det. Standley, *Q. nitens*). Amazonian Brazil.

Quiina grandifolia Mildbr. Notizbl. Bot. Gart. Berlin 11: 299. 1931.

Glabrous, the internodes of the compressed branchlets varying from 3–13 cm.; stipules unknown; petioles scarcely 1 cm. long, very stout; leaves oblong-elliptic, obtuse at base or somewhat cuneate to obtuse base, apex unknown, about 4 dm. long, 18 cm. wide, subentire, lateral nerves about 20 pairs; inflorescences sessile in the axils of leaves often fallen and composed of numerous lax cymes 2–4 cm.

long; pedicels articulate above the base, to 1 cm. long; flowers (male) rather large, sepals greenish, broadly ovate, obtuse, 2 mm. long or suborbicular-ovate, 2.5 mm. long and wide; petals lutescent, oval or suborbicular, 4.5 mm. long, 3 mm. wide; stamens about 35.—Notable for the unusual inflorescence (author); type 17 meters tall, trunk 1.7 dm. in diameter; flowers sought by bees. F.. Neg. 15565.

Loreto: Pongo de Manseriche, *Tessmann 4060*, type.

Quiina Klugii Macbr. Candollea 5: 387. 1934.

Glabrous, the type a tree 7 meters high, the younger branchlets little compressed; stipules about 1 cm. long, foliaceous or linear-lanceolate, sometimes nearly subulate-setaceous; petioles 4–6 mm. long; leaves elliptic or ovate-elliptic, about 14 cm. long, 5.5–6 cm. wide, shortly acute at base, more or less abruptly and obtusely caudate-acuminate, chartaceous, lustrous above, the lateral nerves about 20, rather prominent both sides; inflorescences mostly geminate, axillary, suberect, bracts minute, ovate, acute, flowers solitary, the pedicels 5–7 mm. long; sepals 4, subrotund, 3 mm. long; petals 5–6.3 mm. long, ciliolate, and more or less coherent at base with the 10 or so stamens; anthers globose; ovary ovoid, nearly 2 mm. long, subequaling the 2 styles.—Foliage strikingly like that of other species but its relationship evidently with *Q. florida* (Poepp.) Tul., from which (besides in aspect) it differs notably in floral characters. Here would be sought by my expedient key *Q. obovata* Tul., found as near as São Paulo de Olivença; it is recognizable at once by the long (1–3 cm.) petioles. *Q. coriacea* A. C. Smith, *Krukoff 8771*, from same area, has rigid coriaceous leaves about 9 × 2.5 cm.

Loreto: Mishuyacu near Iquitos, *Klug 228*, type.

Quiina nitens Macbr. Candollea 5: 388. 1934.

Type a tree 6 meters high, the younger terete branchlets minutely pilose, the leaves glabrous; stipules foliaceous, linear-lanceolate, to 1.5 cm. long; petioles much enlarged, 5–7 mm. long; leaves elliptic or oblong-elliptic, acute at base, shortly subcaudate-acuminate, mostly about 1 dm. long, 4–5 cm. wide, chartaceous-coriaceous, notably lustrous above, nearly opaque beneath, the lateral nerves impressed above, acute beneath, about 10; flowers 1–3 in axils of bracts, pedicels to 4 mm. long; inflorescences 1–3 cm. long, erect, subsimple, few-flowered; sepals 4, free, rotund, subequal, ciliolate, 2 mm. long, the 4 nearly rotund-obovate glabrous petals 3 mm. long; stamens about 20.—In comparing this tree with *Q. Poeppigiana*

I distinguished it by the shorter very lustrous and heavier leaves and fewer flowers on longer pedicels; now it seems to approach the Peruvian examples of *Q. rhytidopus* Tul. but there may be a constant difference in the shape of the glossy leaves and in the fruit when known.

Loreto: Mishuyacu, *Klug 710*, type.

Quiina peruviana Engler in Mart. Fl. Bras. 12, pt. 1: 481. 1888.

Younger branches (internodes 8–12 mm. long), nearly setaceous linear-subulate stipules (6 mm. long) and many-flowered inflorescences (1.1–1.5 cm. long) puberulent-pilose; leaves subsessile, oblong-elliptic, narrowed at base, shortly acuminate, remotely serrulate, 7–10 cm. long, 2–3.5 cm. wide, the 15–20 lateral nerves 3–5 mm. distant, distinctly prominent both sides; pedicels slender, 2–3 times longer than the globose buds; sepals and yellow petals obovate, the former 1 mm. long, pulverulent, the latter 1.5–2 mm. long.—F.M. Neg. 32223.

San Martín: Río Mayo near Tarapoto, *Spruce 4366*, type. Juanjuí, *Klug 4220* (det. Pires; det Standley, *Q. nitens*).

Quiina pteridophylla (Radlk.) Pires, Bol. Técn. Inst. Agron. Norte, Belém 20: 48. 1950. *Touroulia pteridophylla* Radlk. Sitzungsb. Bayer. Acad. Wiss. München 19: 218. 1889. *Q. acutangula* Ducke, Archiv. Jard. Bot. Rio Jan. 4: 143. 1925.

Newer branchlets acutely 5 (4)-angled and conspicuously marked by the scars of the fallen crowded verticillate petioles, these 1.5 (2) cm. long; stipules foliaceous, to 2 cm. long, acuminate; leaves (adult trees) oblong or obovate-oblong, long-attenuate to base, acutely obtuse or narrowly retuse, usually 4–13 (18) cm. long, 1.5–4 (6) cm. wide, minutely serrulate, coriaceous, lustrous, with 14–18 lateral nerves finally anastomosing with the very fine pinnate veins, the approximate transverse veinlets striolate; racemes rather open, mostly in the axils of fallen leaves, 4 (5) cm. long, canescent puberulent including the ovate 2 mm. long sepals, the pedicels verticillate, about 5 mm. long; flowers in type hermaphrodite, ochroleucous; petals about 3 mm. long, apically ciliolate; stamens 12–14, free; fruits to 12 cm. long, striate, the seeds orange-villous.—Seedling leaves 6–8-pinnate, later 3–5-lobed, gradually more entire on adult individuals. *T. pteridophylla* Radlk. is very probably the young plant of a *Quiina* related to *Q. acutangula* (Ducke); unfortunately the author does not explain why it is not the young plant of his

species. A. S. Foster, Amer. Journ. Bot. 37: 159–171. 1950, has given a detailed description of the morphology and leaf-venation of adult and young specimens. F.M. Negs. 9757; 9757a (both, *Q. acutangula*); 19555.

Loreto: Río Nanay, *Williams 1079*. Amazonian Brazil.

Quiina pubescens A. C. Smith, Trop. Woods 58: 29. 1939.

Slender terete branchlets early densely puberulent as the petioles, these 3–6 mm. long, rugose; stipules foliaceous, sparsely pilose, 12–25 cm. long, 3–7 mm. wide; leaves narrowly ovate-elliptic, acutely decurrent at base, acute or shortly acuminate (acumen subacute, to 5 mm. long), 7–13 cm. long, 2.5–4 cm. wide, coriaceous, narrowly revolute, glabrous above unless puberulent midnerve, constantly and softly pubescent beneath, the 7–10 lateral nerves elevated beneath; fruiting inflorescences to 1 cm. long, solitary, compact; sepals 4, glabrous, coriaceous, oblong-ovate, obtuse, 1–2 mm. long; fruits oblong-ellipsoid, conspicuously striate, to 2.5 cm. long, 1.5 cm. broad (or broader?), rounded both ends.—In leaf shape and texture comparable to *Q. Poeppigiana* Tul. and allies but pubescent; to be expected in adjacent Peru.

Río Acre: Near mouth Río Macauhán, *Krukoff 5521*, type.

Quiina rhytidopus Tul. Ann. Sci. Nat. sér. 3. 11: 166. 1849.

Internodes of the branches short, the younger puberulent-pilose; stipules linear-subulate, acute, 3–5 mm. long, about 0.5 mm. wide; petioles 4–5 mm. long, 1.5 mm. across; leaves oblong-lanceolate, narrowed to apex from the lower third, 5–9 cm. long, 2–5 cm. wide, rigid-coriaceous, paler beneath the 10 or so lateral nerves 6–10 mm. distant; racemes 2–2.5 cm. long, puberulent, the pedicels 2–3 mm. long; sepals 2.5 mm. long, obtuse; petals 4, 2.5–3 mm. long, 1.5 mm. wide, the stamens half as long; ovary ovoid, acute, the 2 styles as long; fruit 15–18 mm. long, 1 cm. thick, 2-celled, the 2 seeds reddish pilose, 8 or 9 mm. long.—In the Peruvian specimen the stipules are sometimes 3 mm. wide, racemes to 8 cm. long, leaves to 1.5 dm. long, 5 cm. wide, fruits 1.5 cm. thick, deep red, acidulous. Grows in marshes and periodically inundated terrain (Ducke). *Q. Blackii* Pires, Bol. Técn. Inst. Agron. Norte, Belém 20: 44. *pl. 8.* 1950, from adjacent Amazonian areas has large chartaceous repand-serrulate leaves, fruits 2.5 cm. long. Illustrated, Mart. Fl. Bras. 12, pt. 1: *pl. 110, fig. 4* (ovary).

Loreto: Río Itaya, *Williams 67* (det. Pires; det. Macbride, *Q. Poeppigiana*). Iquitos, *Williams 8067*. To the Guianas.

Quiina Tessmannii Mildbr. Notizbl. Bot. Gart. Berlin 11: 298. 1931.

Branchlets decussately compressed, early ferrugineous puberulent, soon glabrate; stipules rigid, lanceolate-linear, acutely long-acuminate, to 2.5 cm. long, 3 mm. wide; petioles stout, 1–1.5 cm. long; leaves oblong-elliptic, obtuse or cuneately narrowed at base, rather long-acuminate, to 23 cm. long, 9 cm. wide, subentire, minutely pilose only on midnerve and lateral nerves, these above little, beneath strongly marked, about 20 pairs; inflorescences about 2 cm. long, many-flowered, mostly pseudo-terminal, the flowers irregularly cymose-glomerulate and pseudo-racemose, on slender pedicels to 4 mm. long; flowers small (male), sepals somewhat unequal from broadly ovate base, very obtuse, scarcely 1.5 mm. long, 1 mm. wide, the suborbicular-oval petals about 2 mm. long; stamens about 30. —The flowers are borne from stipuliform bracts or leaves, a problem discussed by the author. Type 25 meters high, trunk 3–5 dm. in diameter. F.M. Neg. 15566.

Loreto: Yurimaguas, not inundated land on the Huallaga, *Tessmann 5506*, type.

THEACEAE. Tea Family

Trees or shrubs with estipulate usually persistent leaves and hermaphrodite or dioecious actinomorphic flowers commonly solitary or sometimes fascicled in the axils, often bibracted and the usually 5 perianth segments spiralled. Stamens ordinarily many in several whorls, the fascicles adnate to the subtending petals, less often free; anthers 2-celled, rarely dehiscing by pores. Pistil 1, the sessile ovary mostly 3–5-celled, the placentations axile, the ovules usually 2 or more to each cell, anatropous, the styles as many as carpels, sometimes connate. Fruit a capsule, nearly subligneous or fleshy and indehiscent, the seed non-arillate.—Compiled with little change from Kobuski's "studies" (Journ. Arnold Arb. 1935–1950), as termed by the author; they are monographic in importance, thanks to the cooperation of the European botanists in charge of the collections during 1929–1939, who permitted the collation for Field Museum of types, whenever scientifically practical.

Tea and Camellia, fragrant and pleasing, are of course the notably popular plants of this widely distributed family, which has

been known as Ternstroemiaceae—compare Sprague, Journ. Bot. 61: 17–19, 83–85. 1923, in favor of Theaceae, and Fawcett & Rendle, l.c. 52, 85, in rebuttal.

Flowers often solitary, axillary; fruit indehiscent or a loculicidal capsule.

Flowers and capsular fruits medium to large; anthers versatile. 1. *Laplacea.*

Flowers small; fruit a berry or not regularly dehiscing; anthers basifixed.

Leaves serrulate, usually pubescent at least younger; flowers 1–4 . . . . . 3. *Freziera.*

Leaves usually entire, glabrous; flowers solitary. 4. *Ternstroemia.*

Flowers (Peru) paniculate; petals contorted; fruit a septicidal capsule . . . . . 2. *Bonnetia.*

1. LAPLACEA HBK.

Reference: Kobuski, Journ. Arnold Arb. 31: 405–429. 1950.

Somewhat hirsute or glabrate shrubs or trees with subsessile leaves mostly crowded toward tips of branchlets and solitary rarely binate flowers in the upper axils. Bractlets pedicellar, caducous. Sepals and petals 5, rarely more, the former unequal, graduated toward the strongly imbricate petals, these lightly connate at base. Stamens many, the outer or all more or less united, rarely connate into a tube, or 5-fascicled and adhering to petals. Anthers versatile. Ovary 5– (6–10–), sometimes 4-celled, with as many short divergent styles or the stigmas sessile; ovules 4–8 in each cell, pendulous. Capsules oblong, loculicidally dehiscent, the columella persisting. Seeds flat, extended into an oblong wing, few in each cell.—The name conserved; cf. Kobuski, l.c. 28: 435–438. 1947.

Leaves at least some obviously asymmetrical . . . . . *L. fruticosa.*
Leaves symmetrical.

Leaves spathulate, abruptly long-attenuate to base, to 3 cm. wide. *L. spathulata.*

Leaves lanceolate, elliptic or obovate, about 4 cm. wide. *L. pubescens.*

Laplacea fruticosa (Schrader) Kobuski, Journ. Arnold Arb. 28: 437. 1947; 408. *Wikstroemia fruticosa* (*"fructicosa"*) Schrader,

Gött. Gel. Anzeig, 1821, pt. 1: 711. May 5, 1821. *Lindleya semiserrata* Nees, Flora 4, pt. 1: 328. June 7, 1821, *nom. nud.*, as syn. *Haemocharis semiserrata* (Nees) Mart. Nov. Gen. & Sp. 1: 107. *pl. 66*. 1826. *L. semiserrata* (Nees) Camb. in St. Hil. Fl. Bras. Merid. 1: 300. 1827.

Large tree (recorded to 30 meters tall), glabrous or glabrescent typically (Peru) except the flowers and sometimes the pedicels, these to about 1 cm. long; leaves more or less coriaceous, cuneately sessile or subsessile, all or some (at least apically) obliquely elliptic-oblong, to 1 dm. long, about 2 cm. wide above the middle, sometimes nearly to the usually obtuse apex, the margin least extended, from the now and then pubescent midrib, at most 7 mm. distant and typically entire, the upper margin (to 1.5 cm. distant) serrulate (typically) above the middle; sepals concave, rounded, thick, dorsally appressed pubescent except the membranous margin, usually at most 1 cm. long; corolla to 6, usually about 3 cm. across the 5 or more white malodorous petals, obovate, deeply cleft, commonly 1.5 cm. long, 1 cm. wide, sometimes twice as large, pubescent medially without; stamens many, seriate; ovary early densely sericeous, usually 5-celled, the 5 short glabrous styles with as many bifid spreading stigmas; capsules subligneous, ridged, glabrescent, about 2 cm. long, rarely 3 cm. long.—After Kobuski, who gives complete synonymy and discussion, l.c. 31: 412–413. He observed some specimens with symmetrical leaves serrulate on both margins; apparently specific demarcation is not understood or specific stabilization is in some way affected as has been proven for many groups when studied genetically. Designated variants include *pulcherrima* (Melchior) Kobuski, l.c. 414—*L. pulcherrima* Melchior, Pflanzenfam. ed. 2. 21: 136. 1925—scarcely more than a form or vigorous individuals with leaves to 12 cm. long, 3 cm. wide and very sericeous sepals, while *symplocoides* (Tr. & Pl.) Kobuski, l.c.—*L. symplocoides* Tr. & Pl. Ann. Sci. Nat. sér. 4. 18: 269. 1862—refers simply to specimens with all the leaves entire, unless this character is associated consistently with capsules 2–3 cm. long. Here may belong *L. Raimondiana* Melchior, Pflanzenfam. ed. 2. 21: 136. 1925 (Kobuski). F.M. Negs. 9751 (*L. Raimondiana*); 23943 (var.); 9749 (var.). Illustrated, Mém. Mus. Hist. Nat. Paris 16: 472. *pl. 16;* Bot. Mag. 70: *pl. 4129* (both as *L. semiserrata*).

Cajamarca: Tambillo, *Jelski 277; 263* (both det. Szyszyl.). Cutervo, *Raimondi.*—Huánuco: Acomayo to Chincas, 2,400 meters, *Mexia 4137; 7759.*—Puno: Near Sandía, *Weberbauer 1147.* Without

locality, *Weberbauer 4327; 9749* (type, *L. pulcherrima*); *2291* (type, *L. Raimondiana*). To southern Brazil, the Guianas and Central America. "Uas."

Laplacea pubescens Pl. & Lind. ex Tr. & Pl. Ann. Sci. Nat. sér. 4. 18: 269. 1862; 426. *L. quinoderma* Wedd. Hist. Nat. Quin. 33. 1849, fide Kobuski.

Species marked by the symmetrical obovate typically obtuse or subobtuse leaves to 1 dm. long, 4 cm. wide, denticulate both margins, more or less densely pubescent often striately, by the dense tawny indument of calyx and corolla without, ovary and fruit as also the younger branchlets and pedicels, the latter often recurved and only 5–10 mm. long (Kobuski).—Var. *subcaudata* Kobuski, l.c. 427, has leaves 1–1.5 dm. long, subcaudate, the younger densely sericeous, more or less glabrescent in age. F.M. Negs. 9750 (var.); 30142; 35290 (*L. quinoderma*); 9750 (var.); 23941 (type).

Huánuco: Pampayacu, *Poeppig 1597*. Without data, *Ruiz* (type, var.).—Puno: Carabaya, *Weddell*, type. Bolivia; Colombia.

Laplacea spathulata Kobuski, Journ. Arnold Arb. 31: 424. 1950.

Tall glabrous or glabrescent tree with terete branchlets and membranous exactly spathulate not at all inequilateral leaves, these abruptly long-attenuate to base, rounded at apex, 7–9.5 cm. long, 2.5–3 cm. wide, lustrous above, paler beneath, ciliate, the 15–17 pairs of veins anastomosing before the denticulate margins; pedicels terete, solitary, 1–1.5 cm. long, appressed pubescent as the suborbicular more or less membranous-margined sepals, the larger inner ones about 12 mm. long, 15 mm. wide; petals 5 (–8), white, emarginate, rarely unguiculate, 2–3 cm. long, 1–2.6 cm. wide, appressed pubescent medially; stamens many in about 3 series, the filaments shortly connate; anthers oblong; ovary globose, 5-angled, sericeous, 5-celled.—The truly spathulate symmetrical leaves, denticulate both margins, with long tapering base and rounded apex set this species apart from others known in this region (author). Both collections were distributed as *L. quinoderma* Wedd., now *L. pubescens*. *L. speciosa* HBK. from adjacent Ecuador typically at least has smaller entire leaves and may be expected within Peru.

Loreto: Mishuyacu near Iquitos, *Klug 383*. Mouth Río Santiago, *Tessmann 4592*. Amazonian Brazil.

2. BONNETIA Mart. & Zucc.

Reference: Kobuski, Journ. Arnold. Arb. 29: 393–413. 1948.

Glabrous trees, the evergreen leaves narrowed to the subsessile base, the upper subtending 3–several-flowered peduncles or these disposed in terminal panicles. Bracts and bractlets sometimes conspicuous and persisting. Sepals and petals 5, the former imbricate, subequal, the latter contorted. Stamens many, nearly free, with versatile anthers. Ovary 3 (–4) -celled; styles persisting, 1–3, entire or apically 3-parted, stigmas 3-lobed when style is entire; ovules many, seriately imbricate. Capsules acuminate, septicidally dehiscent above, columella apparently persistent. Seeds linear, extended both ends into a small membranous wing.—Commemorates Charles Bonnet, of Geneva, Switzerland, a botanist locally well-known in the later eighteenth century.

Bonnetia paniculata Spruce ex Benth. Journ. Linn. Soc. Bot. 5: 63. 1861; 406. *B. parviflora* Spruce ex Benth. l.c. *B. paniculata* Spruce var. *parviflora* (Spruce) Wawra in Mart. Fl. Bras. 12, pt. 1: 325. *pl. 67.* 1886, fide Kobuski.

Small rough-barked tree with terete reddish-purple branchlets, oblique coriaceous leaves and open ample pyramidal panicles of white or rose-tinted flowers, the reduced leaves subtending the peduncles promptly caducous; petioles 5 mm. long; leaves oblong-obovate, long-attenuate to base, rounded or obtuse or acute in the narrower leaves, 8–12 cm. long, (2.5) 3–5 cm. wide, entire, the many approximate parallel veins prominent both sides; pedicels 5–10 mm. long, angled, usually in threes; bractlets caducous; sepals red tinged, coriaceous, entire margin subscarious, about 1 cm. long, 6–7 mm. wide, the inner the larger; petals emarginate, to 2 cm. long, 1.5 cm. wide at tip; stamens many, the filaments filiform, the anthers minute; ovary tapering into the apically 3-parted style, this often 8 or 9 mm. long, or, including the capsule, about 2 cm. long.—*B. holostyla* Huber, Bol. Mus. Goeldi 7: 301. 1913; 400, from Amazonas, Colombia, and possibly occurring in adjacent Peru, has similarly oblique leaves but subracemose inflorescence and, especially, a quite entire style, the 3-lobed stigma showing no tendency to part (Kobuski). F.M. Negs. 46118; 3224.

Williams, Field Mus. Bot. 15: 336. 1936, described the anatomy and noted that the dark pinkish or chocolate brown bark was esteemed locally as a substitute for quinine.

San Martín: Tarapoto, *Spruce 4809*, type; *4239* (type, *B. parviflora*); *Williams 5955; 5974*. San Roque, 1,600 meters, *Williams 7674* (det. Melchior). Zepelacio near Moyobamba, *Klug 3450*. Canela Uscha, *Ule 6525* (det. Pilger). To British Guiana. "Cascarilla" (Williams).

3. FREZIERA Swartz

Lettsomia R. & P. Prodr. 77. 1794.

Reference: Kobuski, Journ. Arnold Arb. 22: 457–496. 1941.

Trees, rarely shrubs, with usually serrulate-crenulate often tomentose leaves and small dioecious flowers fasciculate or on short branches, the peduncles apically bibranched. Sepals and petals 5, the former strongly imbricate, the latter distinct or barely connate basally. Stamens 15–30, uniseriate, subcohering to petals; anthers glabrous, basifixed. Ovary 3–5-celled, tapering into the short entire style; ovules many. Staminodia fewer than stamens in pistillate flower. Fruit indehiscent. Seeds 10–50 in each cell, 0.5–1 mm. in diameter.—Name (conserved) honors "a botanist who traveled in South America" (Kobuski); the monographer has argued that the group may be treated as generically distinct from *Eurya* of Asia.

There is pretty obviously a genetic problem concerned with several of the species that have been accepted before their values and relationships can be assessed definitely.

Flowers pedicellate, sometimes shortly; leaves acute or obtuse; petioles 1.5 cm. long.

Leaves glabrous or nearly at maturity.

Leaf base rounded and strongly inequilateral.....*F. angulosa.*

Leaf base acute, little if at all oblique.

Branchlets glabrescent; leaves 7–10 cm. long.
F. spathulifolia, F. Wawrai.

Branchlets hirsutulous; leaves 3–5 cm. long.....*F. parva.*

Leaves clearly pubescent beneath even in age.

Leaves to 2.5 cm. long.....*F. microphylla.*

Leaves mostly about 7 cm. long, 2 cm. wide; flowers small.

Indument drying reddish; fascicles simple.....*F. ferruginea.*

Indument fulvescent; fascicles minutely peduncled or racemiform.....*F. lanata.*

Leaves to 1.5 dm. long, nearly half as wide; flowers large. *F. canescens.*

Flowers sessile; leaves acuminate or petioles elongate.

Leaves long-acuminate, tapering to base. . . . . *F. tomentosa.*

Leaves apiculate or short-acuminate, rounded at base. *F. monzonensis.*

Freziera angulosa Tul. Ann. Sci. Nat. sér. 3. 8: 332. 1847; 466. *Eurya angulosa* (Tul.) Szyszyl. Pflanzenfam. 3, Abt. 6: 190. 1893.

Younger branchlets as the leaves below early pubescent later glabrous (or minutely puberulent on nerves), the latter subsessile, elliptic-oblong, very unequal at the rounded base, acuminate, 1–2 dm. long, 4–7 cm. wide, coriaceous, lustrous, lightly serrulate, the veins prominent both sides; pedicels 1–2 mm. long, sericeous, 4–6-fasciculate; bractlets pubescent, deltoid, sepaloid, 2.5 mm. long and wide; calyx lobes glabrous, 4 mm. long, 3 mm. wide, scarious margined; petals about 6 mm. long, 3–5 mm. wide; stamens about 20; ovary 3-celled as the globose many-seeded fruit, this 5–6 mm. in diameter.—Determinations from Dahlem Herb. F.M. Neg. 35312.

Puno: San Gován, *Lechler 2423.* Chunchosmayo, Sandía, *Weberbauer 1239.* Bolivia.

Freziera canescens Humb. & Bonpl. Pl. Aequin. 1: 25. *pl. 6.* 1805; 490. *Eurya canescens* (Humb. & Bonpl.) Blume, Mus. Bot. Lugd.-Bat. 2: 105. 1856.

Yellowish-canescent tomentose (rarely rufescent) except the older terete branchlets and the leaves above, these lustrous and glabrous; petioles about 1 cm. long, sulcate; leaves more or less oblong-elliptic, cuneate at revolute base, obtuse or obtusely acute, to 1.5 dm. long, 6 cm. wide, serrulate, thick-coriaceous, the many veins slightly elevated above; pedicels fasciculate (1–4) in the axils, stout (about 2 mm. thick), sometimes 6 mm. long; bractlets sepaloid, deltoid, about 7 mm. long, 8–9 mm. wide, apiculate; sepals tomentose medially, ciliolate, 6–7 mm. long, 7–9 mm. wide; petals basally like sepals in texture, inner more membranous, white, ovate, 11–12 mm. long, 6–8.5 mm. wide; stamens 20–25, filaments attenuate both ends, 1 mm. long, anthers linear, 4.5 mm. long; ovary abruptly tapering into short obtuse style, 3-celled as the ovoid fruit, this to 1 cm. long and broad with over a hundred seeds.—After Kobuski who found no 3-parted stigmas or 4-celled ovaries as noted by the authors. Said to be tree 5–6 meters tall but according to

Sawada, who was an intelligent observer of the flora about his hacienda, attains 10 meters.

Huánuco: Pan de Azucar, *Sawada 67*. To Colombia.

Freziera ferruginea Wawra in Mart. Fl. Bras. 12, pt. 1: 284. 1886; 479. *Eurya ferruginea* (Wawra) Szyszyl. Pflanzenfam. 3, Abt. 6: 190. 1893.

Ferrugineous tomentose even to the calyx lobes except the terete branchlets, glabrescent in age and the coriaceous leaves becoming glabrous and lustrous above; petioles 4–7 mm. long; leaves oblong-elliptic, rounded at base, obtusely acute, serrulate, 4–7 cm. long, 1.5–2 cm. wide, the 15–20 pairs of lateral nerves impressed above, prominent below; pedicels 1–3 in the axils, 2–4 mm. long; bractlets 1–1.5 mm. long, the pergamentaceous calyx lobes about 2 mm. long; petals apparently free, 3.5–4 mm. long, oblong, obtuse, the thicker upper half simulating calyx lobes in texture; staminodia none; ovary glabrous, stigma 3-parted.—This seems to be similar to *F. lanata*. F.M. Neg. 9739.

San Martín: Near Guayrapurima Mountain, Tarapoto, *Spruce 4442*, type. Canela Uscha, *Ule 6835*.

Freziera lanata (R. & P.) Tul. Ann. Sci. Nat. sér. 3. 8: 334. 1847; 487. *Lettsomia lanata* R. & P. Prodr. 77. 1794; Syst. Veg. 135. 1798. *Eurya lanata* (R. & P.) Melchior, Pflanzenfam. ed. 2. 21: 149. 1925.

Younger branchlets (older glabrescent), leaves usually beneath and calyx-lobes more or less densely covered with a short buff-colored tomentum, the petioles (2–5 mm. long) and pedicels (2–3 mm. long) pubescent; leaves lustrous or opaque and glabrous above unless near base, coriaceous, serrate, linear to oblong-elliptic, cuneate or subrotund at base, acute, 5–12 cm. long, 2–4 cm. wide, the 20 or more pairs of veins and transverse veins both prominent beneath even under the tomentum; flowers crowded, often appearing fasciculate but usually on short axillary racemiform branchlets, these rarely to 1 cm. long; calyx lobes unequal, 1.5–2 mm. long and broad; petals lightly connate at base, oblong-linear or ovate-oblong, 4–6 mm. long, 1.5–2 mm. wide; ovary glabrous, tapering to the conspicuous 3-parted stigma; fruit globose, many-seeded, 4–5 mm. in diameter.—In Bolivia the indument tends to be more sericeous or sometimes nearly lacking on the leaves as also in some specimens of Weberbauer's collection *5610* (Kobuski). My specimens were

from a compact shrub-tree 4 meters high; the flowers are yellowish-white (Weberbauer). F.M. Neg. 23948.

Cajamarca: Huambos, 2,500 meters, *Weberbauer 4209.*—Huánuco: Without locality, *Ruiz & Pavón,* type. Yanano, 1,800 meters, *3765.*—Junín: San Ramón, 900 meters, *Killip & Smith 24773.*—Amazonas: Molinopampa, *Weberbauer 4330.*—Ayacucho: Ccarrapa, *Killip & Smith 22458.* Above Aína, 1,900 meters, *Weberbauer 5610;* 263. Bolivia.

Freziera microphylla Sandw. Hook. Icon. Pl. 35, pt. 2: *pl. 3450.* 1943.

Similar to *F. parva;* petioles to 1.5 mm. long; leaves elliptic-oblong, minutely apiculate, rounded at base, densely subsericeous tomentose beneath as the sepals without.—Possibly a pubescent ecotype.

Amazonas: Chachapoyas, (*Mathews 1567,* type, Herb. Kew).

Freziera monzonensis (Melchior) Kobuski, Ann. Mo. Bot. Gard. 25: 355. 1938; 496. *Eurya monzonensis* Melchior, Pflanzenfam. ed. 2. 21: 149. 1925.

Petioles 3–3.5 cm. long, alate, involute; leaves oblong-obovate, rounded or obtuse at base, broadly acuminate, 9–14 cm. long, 4–5 cm. wide, slightly serrulate or subentire, coriaceous, pubescent above when young, densely sericeous beneath; flowers 1–3 in the axils, apparently sessile and densely sericeous.—Kobuski from photograph, F.M. Neg. 9741.

Huánuco: Río Monzón, *Weberbauer 3422,* type. Pozuzo, *Weberbauer 6755.*

Freziera parva Kobuski, Journ. Arnold Arb. 22: 485. 1941.

Glabrous except for the pubescent terete lenticellate branchlets, midnerve of small leaves both sides, involutely alate petioles, these 5–8 mm. long, and pilose pedicels, these 3–5 mm. long, 1 or 2, rarely 3 in the axils; leaves elliptic or elliptic-ovate, cuneate to base, obtuse, coriaceous, serrulate, the 15–20 pairs of veins elevated both sides; bractlets deltoid, 1.5 mm. long, about 2 mm. broad, the subrotund ciliolate sepals about 2.5 mm. long and 3 mm. wide, petals elliptic, white, 5 mm. long, 2 mm. wide; staminodia about 20; ovary conic-globose, 3-celled.—A shrub about 1 meter high (Weberbauer), most unusual in the genus (author); the pubescence on the branchlets and midnerves is pilose-hirsutulous.

Amazonas: Jumbilla to San Carlos, 3,000 meters, *Weberbauer 7152*, type.

Freziera spathulifolia (Melchior) Kobuski, Ann. Mo. Bot. Gard. 25: 355. 1938; 472. *Eurya spathulifolia* Melchior, Pflanzenfam. ed. 2. 21: 149. 1925.

Glabrous or glabrescent at maturity unless the leaves beneath, these apparently lustrous above, bractlets and pedicels, these fasciculate (1–4), 3–4 mm. long; leaves oblong-spathulate, rounded or obtuse, tapering to the broadly winged petiole, this 15–17 mm. long or, according to interpretation, 2–3 mm. long, coriaceous, serrulate; bractlets about 1.5 mm. long, suborbicular as the imbricate sepals; petals 5 or 6 mm. long, acuminate; stigma 3-parted on the globose glabrous fruit, this 5–6 mm. in diameter.—Kobuski after the photograph, Melchior having merely indicated the species as new in his key; the species may be kept as a part of *F. Wawrai* but the leaves of that are slightly more oblong-elliptic, these about 7 cm. long, 3 cm. wide; the differences in leaf-shape seem intangible. F.M. Neg. 3423.

Huánuco: Río Monzón, (*Weberbauer 3423*, type).

Freziera tomentosa (R. & P.) Kobuski, Journ. Arnold Arb. 22: 486. 1941. *Lettsomia tomentosa* R. & P. Prodr. 77. 1794; Syst. Veg. 134. 1798. *F. Dombeyana* Tul. Ann. Sci. Nat. sér. 3. 8: 329. 1847, fide Kobuski. *L. Dombeyana* (Tul.) Choisy, Mém. Soc. Phys. Hist. Nat. Genève 14: 125. 1855. *Eurya Dombeyana* (Tul.) Szyszyl. Pflanzenfam. 3, Abt. 6: 190. 1893.

Branchlets toward tips, leaves beneath and bractlets heavily sericeous, the first soon glabrous and scattered lenticellate, the second glabrous above even when young; leaves minutely and mucronately serrulate, oblong-linear-lanceolate, long-acuminate, attenuate into alate involute petioles 1.5–2 cm. long, 15–20 cm. long, 3–4.5 cm. wide, coriaceous, glabrous above, drying golden brown lanuginose beneath; calyces 1–3, sessile, the lobes sparsely pubescent or nearly glabrous, about 6 mm. long and broad; petals at least 1 cm. long, obtuse or rounded at tips.—The Madrid specimen is appressed sericeous with long and short trichomes. F.M. Negs. 35317 (*F. Dombeyana*); 23953.

Huánuco: Without data, *Ruiz & Pavón*, type; *Dombey* (type, *F. Dombeyana*). Río Pozuzo, 1,600 meters, *Weberbauer 6755*.

Freziera Wawrai Urban, Bot. Jahrb. 21: 544. 1896; 483. *F. salicifolia* Wawra in Mart. Fl. Bras. 12, pt. 1: 283. 1886, not Choisy, 1855. *Eurya Wawrai* (Urban) Melchior, Pflanzenfam. ed. 2. 21: 149. 1925.

Glabrous except the minute bracts at base of the 2–5-fasciculate pedicels these to 4 mm. long; branchlets terete; petioles 3–5 mm. long; leaves lanceolate to elliptic, cuneate at base, acute, 8–10 cm. long, 2–3 cm. wide, serrulate, subcoriaceous, the 30 or more pairs of veins prominent both sides; bractlets about 1 mm. long, closely appressed to calyx this with lobes about 2 mm. long and wide; petals linear, 6 mm. long, a third as wide, somewhat involute; ovary tapering from base, 3-celled, many-ovuled.—Urban name not recorded by bibliographers (Kobuski). However, it is listed in Gray Herb. Index. To 5 meters high (Ule). F.M. Neg. 9744.

San Martín: Campana Mountain, *Spruce 4359*, type, and in mountains along Mayo River near Tarapoto, *4841*. Cerro de Escoler, *Ule 6794*.

4. TERNSTROEMIA Mutis

Reference: Kobuski, Journ. Arnold Arb. 23: 298–343. 1942.

Glabrous, the branches often subopposite or verticillate as the upper leaves, these later spirally disposed, rarely dentate, the axillary solitary flowers with usually 2 bracts (infrequently 4) at base of persisting calyx, exceptionally 1 below on the pedicel. Sepals and petals 5 (6), the latter usually somewhat calyptrately connate or if free more or less imbricate. Stamens 25–30, 2- rarely few- or 1-seriate, filaments more or less connate, the outer adnate to petals, anther connective usually projected. Ovary (1) 2–3-celled or sometimes 4–6-celled by accessory septa; ovules (1) 2–20, pendulous. Style ordinarily entire. Fruit rarely dehiscent and then by apical valves or by a circumscissile basal layer, the few opaque smooth yellow seeds often covered with brown many-celled papilli (Kobuski). —The single American species with basally dehiscent fruit is *T. circumscissilis* Kobuski, l.c. 304, from Department La Paz, Bolivia, and conceivably may occur in adjacent Peru. *T. Ruiziana* Moric., Mém. Soc. Phys. Hist. Nat. Genève 7: 257, *pl. 12*. 1836, following Kobuski, l.c. 342, is omitted as not recognized and not of this genus, the distinctly and closely dentate leaves being subamplexicaul, conspicuously veiny both sides, corolla tubular, ovary velutinous.

Leaves acuminate; petioles 1–1.5 cm. long.

Bractlets 2 mm. long; ovary cells 2 . . . . . *T. Klugiana*.

Bractlets 5–8 mm. long; ovary cells 3 ..... *T. penduliflora.*

Leaves rounded or retuse apically, rarely obscurely and shortly acuminate; petioles less than 1 cm. long.

Corolla calyptrate, opening by apical pore; leaves subacuminate. *T. globiflora.*

Corolla with petals about half free, membranous; leaves rounded or retuse.

Leaf veins obviously impressed above; pedicels 2–4 cm. long.

Leaves 6 cm. long or longer; fruits to 2.5 cm. thick. *T. pachytrocha.*

Leaves 2–3 cm. long; fruits about 1 cm. thick. *T. quinquepartita.*

Leaf veins obscure at least above; pedicels shorter than 1 cm.

Leaves coriaceous, veins obsolete; sepals entire .... *T. Jelskii.*

Leaves chartaceous, veins prominent beneath; sepals denticulate ..... *T. brachypoda.*

Ternstroemia brachypoda (Wawra) Kobuski, Journ. Arnold Arb. 23: 332. 1942. *T. Pavoniana* Moric. var. *brachypoda* Wawra in Mart. Fl. Bras. 12, pt. 1: 278. 1886.

Branchlets verticillate; petioles 3–5 mm. long; leaves membranous-chartaceous, oblong-obovate, attenuate at base, retusely obtuse, 2.5–3 cm. long, 1–1.5 cm. wide, denticulate, the midrib impressed above, elevated below as the 4–5 pairs of reticulate veins, these obscure above; flowers small, the pedicels short; bractlets ovate, glandular-denticulate as the orbicular sepals, these hardly longer than the obovate petals; stamens very small, clavate, the obovoid muticous anthers attenuate into the slender filaments; ovary cells 2, 2-seeded, the style short, thick, the stigma punctiform.—It is clear that this deserves specific status (Kobuski), as noted in my manuscript, at least as regards *T. quinquepartita* R. & P. (*T. Pavoniana*), which has suborbicular heavy coriaceous leaves, the veins deeply impressed above; the relationship is quite superficial (author). F.M. Neg. 15438.

Puno: Tatanara, *Lechler 2613*, type.

Ternstroemia globiflora R. & P. Syst. Veg. 179. 1798; 315. *T. globosa* Choisy, Mém. Soc. Phys. Hist. Nat. Genève 14: 104. 1855. *T. minoriflora* Hochr. Ann. Cons. Jard. Bot. Genève 20: 192. 1917, fide Kobuski.

A small tree or shrub unique in Peru by the small globose nearly cleistogamous flowers; petioles 5–7 mm. long; leaves broadly lanceolate, elliptic or obovate, often asymmetrical, cuneate at base, more or less acuminate, to 8 cm. long, 3 cm. wide, entire, subcoriaceous, the 6–8 pairs of veins visible beneath; pedicels pendent, scarcely 6–8 mm. long; bractlets rounded or triangular, not glandular-denticulate, 1–2 mm. long; calyx lobes suborbicular, the outer 2 to 3 mm. long, the inner 4–5 mm. long, scarious margined, not denticulate; corolla white or pale yellow, gamopetalous, about 3 mm. long, the wall 1 mm. thick, 5 minute lobes at apex; stamens 10–16, uniseriate, to 2 mm. long, the filaments sometimes completely connate, the basifixed minute anthers usually ovate; ovary tapering into 1 mm. long style (stigma punctiform), the 2 cells 1–2-ovuled; fruit ovoid, about 1 cm. long and broad, the 2 or 3 buff colored seeds with a reddish brown mealy coating, to 9 mm. long, 5 mm. in diameter.—Often it is impossible to separate the corolla lobes, so tightly do they overlap in the bud (Kobuski).

With *T. quinquepartita* a beautiful shrub for gardens on account of the shapes that may be formed from them (Ruiz & Pavón). F.M. Negs. 23935 (Pavón, type, *T. minoriflora*); 23936; 29387.

Huánuco: Pillao, cool woods, *Ruiz & Pavón*, type.—La Libertad: Below Ongón, 1,300 meters, *Weberbauer 7064*.—Ayacucho: Open woods, Aína, *Killip & Smith 22552*.

Ternstroemia Jelskii (Szyszyl.) Melchior, Pflanzenfam. ed. 2. 21: 142. 1925; 327. *Taonabo Jelskii* Szyszyl. Pflanzenfam. 3, Abt. 6: 189. 1893; Diss. Cl. Math.-Phys. Acad. Litt. Cracov. 29: 224. 1894.

Shrub-tree with elliptic to obovate leaves 3.5–4 cm. long, 1.5–2 cm. wide, lustrous above, opaque below, the petioles as pedicels short; bractlets minute; sepals rounded, broadly ovate, entire, the smaller about 3, the others 4–5 mm. long; petals orbicular, the much shorter stamens 2 or more seriate, the filaments thick, the oblong anthers minutely caudate; ovary complanate-globose, 2-celled, the style 1.5–2 mm. long, stigma peltate, subbifid; fruits ovoid, 12–14 mm. long, the 4 seeds 7 mm. long.—To this original diagnosis Kobuski has noted that *Weberbauer 6341* (2 meters high, flowers white) has sturdy pedicels 0.5 mm. long, those of other specimens about twice as long, more grouped; also that those filaments seen are slender, well exceeding the anthers. My field notes read: flowers and fruits yellow, anthers red, but apparently the corollas were lost. As Kobuski

suggests, the interpretation of the species is not certain. F.M. Negs. 23938 (Spruce); 9746.

Piura: Huancabamba to Ayavaca, 3,000 meters, *Weberbauer 6341*.—Cajamarca: Cutervo, *Jelski 254*, type; *Raimondi*.—San Martín: Near Tarapoto, *Spruce 4241; 4825*.—Huánuco: Toward Pampayacu, 2,700 meters, *Kanehira 68*. Panao, *3610*. Rocky places, Yanano, *3777*. Ecuador.

Ternstroemia Klugiana Kobuski, Journ. Arnold Arb. 23: 334. 1942.

Terete branchlets verticillate; petioles about 1 cm. long; leaves oblong-obovate, basally long-attenuate, apically abruptly acuminate, entire, coriaceous, lustrous, and the 15 or more pairs of rather straight veins not at all apparent above, obscure beneath; pedicels erect, about 9 mm. long; bractlets ovate, acuminate, 2 mm. long, 1–1.5 mm. wide, sparsely (1–3) glandular-denticulate as the outer ovate subacute sepals, these about 2 mm. wide, 3.5–4 mm. long, the broadly elliptic or obovate obtuse inner sepals scarious margined (not denticulate), 2.5–3 mm. long; petals membranous, obtuse, about 5.5 mm. long, 2–3 mm. wide, basally connate 3 mm.; stamens about 25, 3–4 mm. long, the apicules 1 mm. long or longer than the compressed filaments; ovary cells 2, 1-ovulate, the style to 3 mm. long, the stigma punctiform; fruits distinctly conical, about 7 mm. long, 6 mm. in diameter at base, 1 mm. at tip.—The Klug specimens from trees 8 or 15 meters high; flowers white (number *64*) or orange, this number, distributed as *T. Candolleana* Wawra of Brazil, a species only superficially similar.

Loreto: Mishuyacu near Iquitos, *Klug 64*, type; also *1561*.

Ternstroemia pachytrocha Kobuski, Journ. Arnold Arb. 23: 320. 1942.

Leaves broadly elliptic or obovate, attenuate to stout petiole (5–6 mm. long) from obtuse base, rounded or subretuse at apex, 6–8 cm. long, 3.5–4.5 cm. wide, entire, fleshy-coriaceous, punctate and midnerve raised beneath, but the 5–6 pairs of veins impressed above, inconspicuous below; fruiting pedicels stout, 3–4 cm. long; bractlets broadly ovate, about 3 mm. long, 5 mm. wide, subapiculate; sepals 9–13 mm. long, 10–15 mm. wide, apparently entire, not glandular-dentate; fruits subglobose, 17–25 mm. long, 22–25 mm. in diameter, the pericarp 4–6 mm. thick, the 2 cells each with 5–8

seeds, these 6–8 mm. long, 5–7 mm. broad.—So thick is the fruit wall that the seeds seem imbedded in a spongy matrix (author).

Huánuco: Pampayacu, *Kanehira 44*, type.

Ternstroemia penduliflora Kobuski, Journ. Arnold Arb. 23: 311. 1942.

Branchlets grayish-brown, terete; petioles about 1.5 cm. long; leaves elliptic or obovate, long-attenuate to base, acuminate, in type membranous but apparently young, 12–16 cm. long, 2.5–4.5 cm. wide, opaque both sides, midnerve prominent below, the 20–30 pairs of branched veins not at all so; pedicels slender, pendulous, about 4 cm. long; bractlets ovate, 5–8 mm. long, 2.5–3 mm. wide, distinctly long-acuminate, entire; sepals broadly obovate, 7–10 mm. long, 2.5–3 mm. wide, rounded or subtruncate, outer marginally sparsely glandular-denticulate, inner scarious; petals oblong-obovate, about 8 mm. long, 3–4 mm. wide, connate half their length, truncate or rounded, crenulate; stamens about 40 in 1 series, filaments basally connate, anthers linear, apiculate; ovary cells 3, 2 or more ovulate, the style with punctiform stigma.—Leaves probably coriaceous when mature; closely allied to *T. Klugiana* (author). Type a 9 meter tree with white and rose flowers (collector).

Loreto: Mishuyacu near Iquitos, *Klug 1487*, type.

Ternstroemia quinquepartita R. & P. Syst. Veg. 180. 1798; 338. *T. Pavoniana* Moric. Mém. Soc. Phys. Hist. Nat. Genève 7: 258. *pl. 13*. 1836, fide Kobuski. *Taonabo Pavoniana* (Moric.) Szyszyl. Pflanzenfam. 3, Abt. 6: 189. 1893.

Well-marked by the combination of small heavy-coriaceous leaves with veins deeply etched above and long (2–2.5 cm.) apically recurving pedicels; petioles to 3 mm. long; leaves oblong-obovate, cuneate at base, emarginate at apex, obscurely callous-serrulate, the 3–4 pairs of veins faint below, the transverse veins equally impressed above; bractlets ovate-lanceolate, carinate, about 3 mm. long, glandular-denticulate as the outer calyx lobes, all pergamentaceous, suborbicular, 5–6 mm. long, about 4 mm. wide; petals lightly connate at base, obovate, to 7.5 mm. long; stamens very many in several series, the slender filaments 2 mm. long, firmly connate at base, the oblong anthers shortly mucronulate; ovary minute, 2-celled, 3–4 ovules in each cell, the thick style about 1.5 mm. long, stigma peltate; fruits subglobose-subconical, about 1 cm. long, 2-celled, with 2 seeds 5–6 mm. long.—After Kobuski, who

notes Moricand's suspicion that his species might be the same as that of Ruiz and Pavón, but that it was impossible from Pavón's simple description to be certain; apropos the present monographer has generously remarked: fortunately I have before me the fragmentary isotype and photograph of Pavón's actual type; the original description is useless. Found with *T. globiflora* and like it a beautiful shrub for gardens on account of the shapes into which it may be pruned (Ruiz & Pavón). F.M. Negs. 23937; 29388.

Huánuco: Near Pillao, *Ruiz & Pavón*, type; specimen at Geneva, type, *T. Pavoniana.*

ADDENDUM

Based on *Malvacées du Pérou récoltées par le Professeur Rauh*, Candollea 15: 175–181. 1956, by B. P. G. Hochreutiner.

Palaua tomentosa Hochr. in Ann. Cons. Jard. Bot. Genève 5: 171. 1901.

Ica: Pongo, 500 meters, (*Rauh & Hirsch P489*, det. Hochreutiner).

Palaua trisepala Hochr. Candollea 3: 176. *fig. 5.* 1956.

Tomentose herb; stipules dentiform; petioles rosulate, to 6 cm. long, the shorter blades crenate, ovate-elliptic, cordate, rounded apically; peduncles 6–9 cm. long; sepals 3, cordate-ovate, obtusely acuminate, 1.5 cm. long, 9 mm. wide; petals 5, ciliolate; stamen tube conic-cylindric, filaments as style branches many; carpels black, oboval, rugose.—Subgenus *Rauhia* Hochr. l.c., unique by the three sepals!

Ica: Pongo, 200 meters, (*Rauh & Hirsch P474*, type).

Malvastrum Albertii (Phil.) Reiche, Fl. Chile 1: 23. 1896. *Tarasa Albertii* Phil. Anal. Univ. Santiago 82: 321. 1893; Krapovickas, Bol. Soc. Argent. Bot. 5: 133. 1954, with plate.

Shortly canescent pubescent; leaves triangular oval, 3-lobulate, the lobes coarsely approximate; flowers in terminal racemes; calyx 6 mm. long, corolla nearly 3 times longer; carpels 3 mm. long, beak only 2 mm. long.

Lima: Lomas, Lachay, (*Rauh & Hirsch P52*, det. Hochreutiner). Chile.

Malvastrum nototrichoides Hochr. Candollea 5: 177. 1956.

Pulvinate, depressed or repent, stellate pubescent; stipules linear-subulate, 1–2 mm. long; petioles 3–10 mm. long; leaves suborbicular, trisected, the 3 lobes dissected and lobulate, usually the 2 lower (3 × 4 mm.) well-distant from the large (6 × 4) upper; glomerules shortly spicate, 2 involucral linear bracts as long as calyx, this cupulate, 5 mm. long, 4 mm. across at top, 5-lobate; corolla blue-violet, scarcely 1 cm. long; stamen tube glabrous, anthers nearly free, about 5; ovary as fruit densely setose, 5 cells rugose,

scarcely birostrate.—Facies *Nototriche* but involucrate axillary flowers of *Malvastrum* (author).

Arequipa: Tinopalca, 4,200 meters, (*Rauh & Hirsch P628*, type).

Malvastrum peruvianum (L.) Gray, var. **elongatum** Hochr. Candollea 15: 177. 1956.

Indument sparse, inflorescence 3–5 cm. long, exceeding leaves, the flowers very remote.

Ica: Pongo, (*Rauh & Hirsch P493*, type).

Nototriche anthemidifolia (Remy) Hill, Bot. Jahrb. 37: 579. 1906.

Cuzco: Nevado Ausengate, 5,100 meters, (*Rauh & Hirsch P1138*, det. Hochreutiner).

Nototriche argylloides Hill, in Trans. Linn. Soc. Lond. 7: 245. 1909.

Arequipa: Salinas, 4,200 meters, (*Rauh & Hirsch P629*, det. Hochreutiner).

Nototriche ovalifolia Hochr. Candollea 15: 179. 1956.

Caudex at apex 1.5 cm. across; stipules subulate, 7–10 mm. long, 1.5 mm. wide at base, nearly glabrous as vagina, this 8 × 4 mm., slightly ciliate toward purplish tip as petioles, calyx lobes; leaves ovate, sometimes suborbicular, cordate or rounded at base, not deeply but obtusely 3- or 5-lobed, crenate, above sparsely, beneath densely long-ciliate, the trichomes simple; calyx about 1 cm. long and wide, the triangular lobes acute, pilosulous at tip; corolla funnelform, about 5 × 4 cm., the obovate glabrous petals violet toward apex, some setae near base; stamen column 2 mm. long, anthers in a cylindric head; ovary setose.—Unlike other large-flowered species in relatively larger leaves, slightly divided (author).

Junín: Huaytapallana, 4,200 meters, (*Rauh & Hirsch 1728a*, type).

Nototriche pusilla Hill, Bot. Jahrb. 37: 587. 1906.

Ica: Nazca to Puquio, 4,000 meters, (*Rauh & Hirsch P446*, det. Hochreutiner).

Nototriche Rauhii Hochr. Candollea 15: 178. 1956.

Depressed, pulvinate; caudex erect, about 2 cm. high, cylindric-spherical, with the rosulate leaves about 2 cm. across; stipules

subulate, very ciliate; leaves 4–5 mm. long including vagina (2 mm. long), limb 2–3 mm. long and wide, the 2–3 lobes subovate, 2 × 1 mm. (sometimes there are 1 or 2 minute lobules), long-pubescent above and marginally, nearly glabrous beneath; calyx 8 mm. long, lobes 5 mm. long, 2–3 mm. wide at base, villous outside as within except tube; petals violet, obovate, emarginate, 23 mm. long, half as wide, villous only at base, with stamen tube (this 1.5 cm. long) only coalescent 1–2 mm.; anthers in spherical head 3 mm. thick.—Naturally in section 2 of Hill's monograph, next to *N. Hartwegii* with larger leaves, smaller corollas, cylindric stamen head; the leaves are much more rounded than those of *N. flabellata* and *N. condensata*, both with spheroid stamen heads (author); named for Professor W. Rauh of Heidelberg.

Nototriche villosissima Hochr. Candollea 15: 180. 1956.

Rosulate, the caudex about 1.5 cm. across, the entire plant densely tomentose-villous with stellate trichomes often 2–3 mm. long; petioles 3–5 cm. long; leaves ovate, more or less deeply dissected, at least 3-pinnatifid, to 2.5 cm. long, 2.2 cm. wide; calyx cupulate, 1.5 cm. long, lobes 3-nerved, 1 cm. long, glabrous within except at tip; corolla violet-blue, 2 cm. long, slightly pilose only at base, tube merely 1 mm. long; stamen column very short, glabrous, the cylindric anther head about 4 mm. long; ovary globose, setose; immature carpels shortly biaristate, long-sericeous.—Indument thicker and longer than that of *N. argentea* with leaves glabrous and nervose beneath, and stamen column 4 mm. long (author).

Cuzco: Nevado Ausangate, 4,600 meters, (*Rauh & Hirsch P1250*, type).

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